# Products finishing

Volume 9 APRIL, 1945 Number 7



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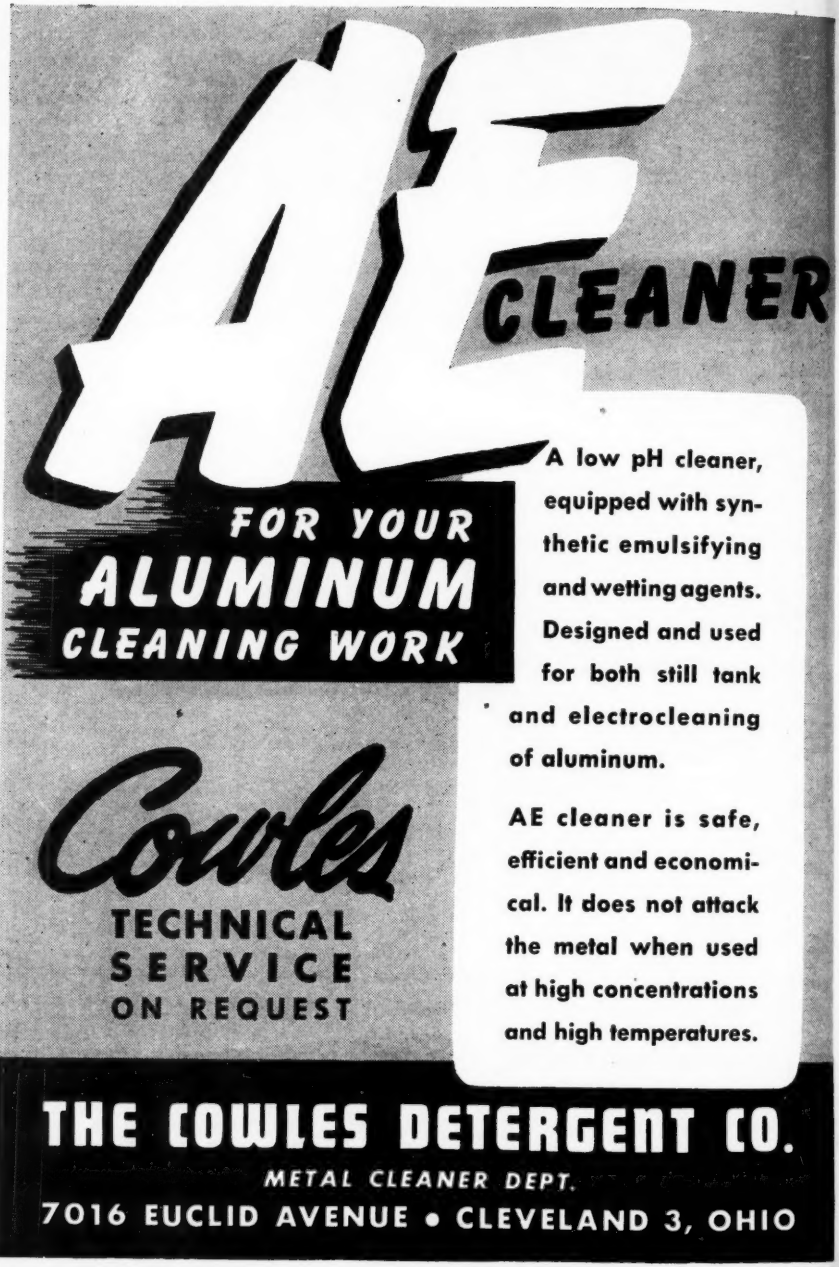
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Products finishing

# Cardone, American

I will never forget that fellow. Cardone, his name was—Angelo Baptiste Cardone. An Italian by birth, he was a little chap on the first stage of the metal-finishing line, the rough grind.

His job was a tough one. The parts were heavy, and a lot of metal had to be cut away. But Cardone never complained. Every part that went through his hands seemed to inspire him with a passionate eagerness to get at the next one. He boasted that he was the best grinder in the world.

Other employees soon began to believe that. Certainly, he turned out more work than anyone else inside their experience. Moreover, it was always within tolerance. The word got around the shop: Cardone is good—he deserves something better.

About this time a vacancy occurred on an earier job up the line, and Cardone was offered a transfer. To everybody's surprise, he refused. Union and management alike tried to pursuade him, but he remained adamant. Finally, sensing something unusual in the case, the company sent me to have a talk with him.

He was working like a Trojan when I stopped by his booth. Seeing me, he made no move to turn off his grinder, but merely shouted above the din. "Hello, Mr. Duncan. Anybody tell you I am bes' grinder in world? Look, I show you." He pointed to three castings just finished. "See these?" he beamed. "They my three sons in U. S. Army. Don' they look nice?" They certainly did, I admitted. Then he picked up a rough casting, 37 pounds. "See this fellow? He bad. He stinky Mussolini. See, I grin' his dam' chin off." Buzz-z-z—off went Mussolini's chin. "See this one? He stinko Hirohito. I grin' his dam' teeth out." Buzz-z-z—out went Hirohito's teeth. "But jes' wait. You no see nothin' yet. That nex' one there, he Hitler. I murder heem."

At last report, Cardone was still the world's best grinder. And, incidentally, one of the world's best Americans.

APRIL, 1945 Vol. 9, No. 7

# Evaluating RUST Preventatives

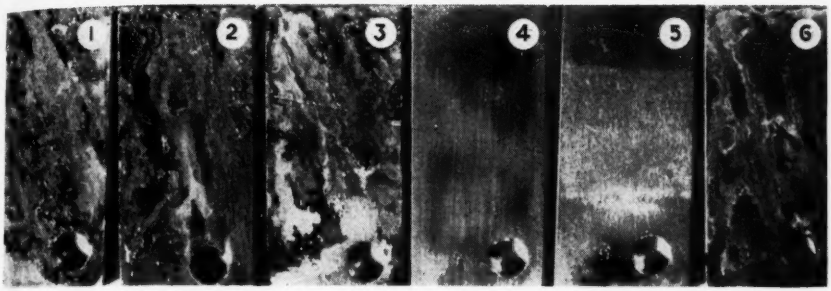
By BRYANT W. POCOCK

THE problem of preventing corrosion of steel parts is a very real one to the metal finisher. The agencies which work to produce corrosion are numerous and imperfectly understood at best, but their effects are well known. It frequently happens that polished steel surfaces begin to corrode without apparent reason. Finding the reason and correcting it may entail a lengthy bit of detective work, for which neither the time nor expense can be afforded. It is only logical, therefore, that there should be made available certain rust-preventative preparations by the use of which a continuance of corrosion may be prevented, even though all the factors contributing to its development may not be recognized immediately.

Many suggestions for evaluating rust preventatives have appeared in literature, and many have been adopted. Most of these make use of the salt spray, which is one of our oldest tools for the production of accelerated weathering. Regardless of the controversial issues which have been associated with this apparatus for a generation, the fact remains that the salt spray has not been superseded. We merely have a more accurate appreciation, not so much of its limitations, as of the proper control of its use.

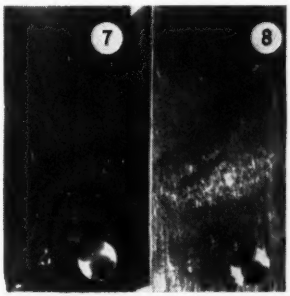
In one method of appraisal, rust preventatives have been applied to similar polished steel surfaces, the samples placed in the salt spray cabinet, and the time of first appearance of corrosion noted. In another method, an attempt is made to estimate the extent of area covered by corrosion after a definite time interval has elapsed. It will be observed that in both of these methods, which have enjoyed moderately wide acceptance, no assurance of objectivity on the part of the operator is provided. Skilled laboratory technicians in fact have been found to differ in their ability to recognize the first symptoms of corrosion. Even when equipped with transparent scales marked off in unit areas, no two operators as a rule have been found in agreement as to the corroded area on the same sample.

With the limitations of existing methods in mind, a procedure is herein discussed for evaluating rust preventatives, which purports to eliminate the uncertainties of older methods and to substitute a scientifically acceptable and reproducible technique. An advantage claimed for the method is its high objectivity, with almost complete suppression of the "personal equation." The method is applicable to all known rust preventatives.




**Procedure**

Relative comparisons of the efficacies of rust-preventative preparations are performed by means of salt spray tests made under comparable control conditions, using small rectangular steel samples and noting the percentage gain in weight due to formation of rust.

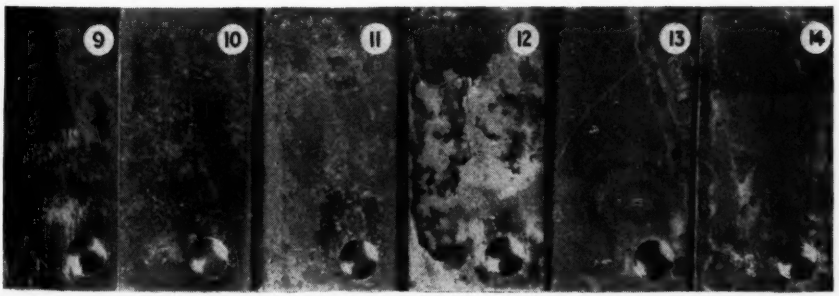


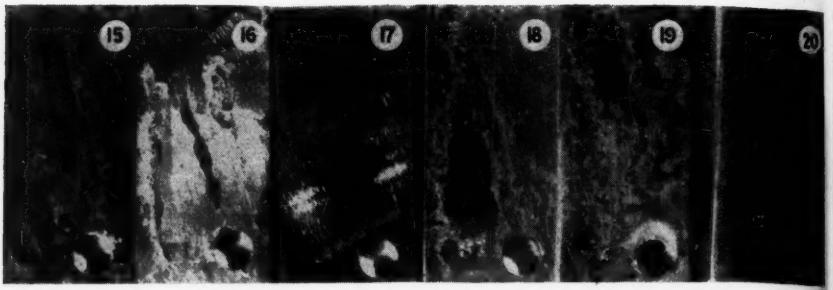

According to Strausser, Brenner and Blum[1], "In salt spray testing, the comparative condition of all panels at the end of a suitable test period is a better measure of the value of a coating than is a comparison of the time of initial failure."

High speed steel specimens measuring 1 x 2 x ⅛ inch are used, weighing approximately 20 grams each. These are sanded free from pits and polished. They are numbered by stamping, and a suitable hole is bored in one corner of each panel for convenience in hanging.

The panels are cleaned in carbon tetrachloride, wiped thoroughly with clean, lintless cloth, and weighed accurately at room temperatures to the nearest 0.0001 gram. With a little care it will be found possible to make accurate weighings to the nearest 0.00005 gram, provided a good analytical balance is available. The steel panels are suspended on glass hooks, and are not

[1] Strausser, Brenner and Blum, *Proceedings of Educational Sessions of the Thirtieth Annual Convention of the American Electroplaters' Society*, p. 81, June, 1942. See also Blum, Strausser and Brenner, Research Paper R. P. 724, *Journal of Research*, National Bureau of Standards, 13, pp. 519-26, 1934.






touched by the fingers henceforth.

The panels are immersed for two minutes in the rust-preventative preparations to be tested. As a rule, it will be found of advantage to consider the manufacturer's recommendations at this point and to follow them as far as is consistent with the desired degree of objectivity of the test. All preparations should be stirred thoroughly before immersion. The panels are hung up to dry in still air at room temperature for 24 hours, care being taken to account for any corrosion-promoting substances in the air of the room, since it is particularly advantageous to eliminate them.

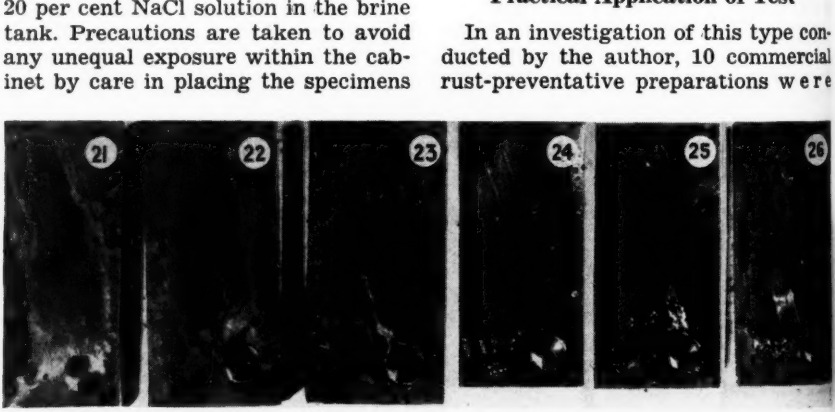
The samples are next suspended in the salt spray cabinet for 24 hours at 95 deg. F., 15 lbs. per square inch positive atmospheric pressure, and with 20 per cent NaCl solution in the brine tank. Precautions are taken to avoid any unequal exposure within the cabinet by care in placing the specimens and by compensating for local inequalities in the force of the spray.

The panels are removed from the cabinet after the 24-hour exposure and rinsed in distilled water at room temperature. Particular care is taken during rinsing to preclude the possibility of dislodging any rust particles which may have formed. The panels are hung up and allowed to dry as before.

The specimens are next very carefully degreased in carbon tetrachloride, allowed to dry at room temperature, and weighed. The gain in weight multiplied by 100, divided by the original weight, is the percentage gain in weight. This is expressed in units of percentage gain in weight multiplied by $10^{-2}$, and the results are plotted as bar graphs.

### Practical Application of Test

In an investigation of this type conducted by the author, 10 commercial rust-preventative preparations were



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tested, most of them in three different dilutions with oleum spirits, making 26 cases in all. The manufacturer's recommendations were followed in each instance. The preparations and dilutions were as follows:

| Panel | Preparation | Dilution |
|---|---|---|
| 1 | A | Straight |
| 2 | A | 1:1 oleum spirits |
| 3 | A | 1:2 oleum spirits |
| 4 | B | Straight |
| 5 | B | 1:1 oleum spirits |
| 6 | B | 1:2 oleum spirits |
| 7 | C | Straight |
| 8 | C | 1:1 oleum spirits |
| 9 | C | 1:2 oleum spirits |
| 10 | D | Straight |
| 11 | D | 1:1 oleum spirits |
| 12 | D | 1:2 oleum spirits |
| 13 | E | Straight |
| 14 | E | 1:1 oleum spirits |
| 15 | F | 1:1 tap water |
| 16 | G | Straight |
| 17 | H | 1:1 oleum spirits |
| 18 | H | Straight |
| 19 | G | 1:1 oleum spirits |
| 20 | H | 1:2 oleum spirits |
| 21 | I | Straight |
| 22 | I | 1:1 oleum spirits |
| 23 | I | 1:2 oleum spirits |
| 24 | J | Straight |
| 25 | J | 1:1 oleum spirits |
| 26 | J | 1:2 oleum spirits |

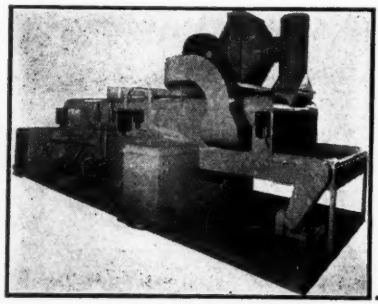
The peculiar sequence of preparations G and H in the above series was due to an error in the arrangement of panels 17 and 19, which in no way affected the test. Preparation F was a water-soluble cutting oil.

The following table gives the original and final weights of the test panels and percentages of gain in weight for the series:

| Panel | Orig. Wt., gm. | Final Wt., gm. | Percentage Gain in Wt. x 10- |
|---|---|---|---|
| 1 | 20.28363 | 20.29380 | 5.0138 |
| 2 | 20.33520 | 20.34555 | 5.0896 |
| 3 | 20.61830 | 20.63110 | 6.2080 |
| 4 | 20.28170 | 20.28400 | 1.1340 |
| 5 | 20.36405 | 20.36545 | 0.6875 |
| 6 | 20.10170 | 20.11880 | 8.5067 |
| 7 | 20.30140 | 20.30175 | 0.1724 |
| 8 | 20.49255 | 20.49315 | 0.2925 |
| 9 | 20.40790 | 20.41055 | 1.2985 |
| 10 | 20.11385 | 20.11780 | 1.9638 |
| 11 | 20.04393 | 20.04905 | 2.5544 |
| 12 | 20.52000 | 20.52895 | 4.3618 |
| 13 | 20.16660 | 20.18010 | 6.6942 |
| 14 | 20.81317 | 20.83000 | 8.0862 |
| 15 | 20.26824 | 20.29030 | 10.8840 |
| 16 | 19.90150 | 19.91320 | 5.8790 |
| 17 | 19.52635 | 19.52825 | 0.9730 |
| 18 | 19.93620 | 19.94415 | 3.9877 |
| 19 | 21.86630 | 21.87980 | 6.1739 |
| 20 | 22.08640 | 22.09705 | 4.8220 |
| 21 | 22.43770 | 22.47995 | 18.8299 |
| 22 | 21.39500 | 21.43830 | 20.2383 |
| 23 | 22.75340 | 22.79770 | 19.4698 |
| 24 | 22.15715 | 22.16250 | 2.4144 |
| 25 | 22.06735 | 22.07995 | 5.7098 |
| 26 | 22.33665 | 22.35720 | 9.2001 |

## Discussion

A comparison of the results shown in the bar graph indicates that the

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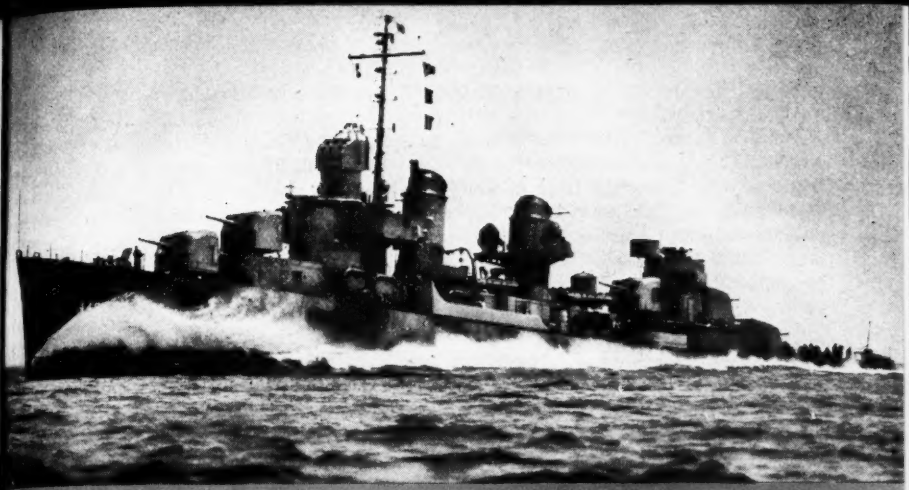

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How fine these ships are is well expressed in the following extract from a letter written by the commanding officer of the destroyer pictured above:

*"A word of praise for the grand job the Bath Iron Works did on the ship. She has been through h—l and high water and never failed us. Keep on building ships as fine as this . . . We have put on nearly one hundred and fifty thousand miles and she is as good as new."*

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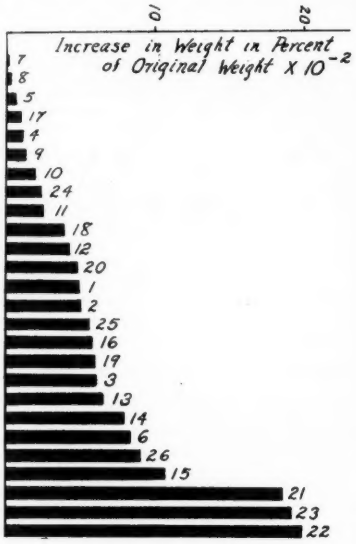
products tested differ widely in their ability to afford protection against corrosion. Whereas objections might be raised against an interpretation on the basis of these results that product C is 33 times as good as product I, there can be no doubt that under the conditions cited, 33 times as much rust was formed with product I as occurred with product C.

It is interesting to observe in this connection that as a general rule the protection afforded by any product tested diminished progressively with its dilution in oleum spirits. The only exception was with product I, indicating that the rust-preventative properties of this material must be approximately the same as those of oleum spirits under the conditions of the test.

Reference to the illustrations of the panels shows that for moderate degrees of corrosion, the extent of the corroded area follows the position in the graph closely. This is not true, however, in cases where the corrosion is considerable, indicating the futility of attempting to correlate area with depth of corrosion.




Bar graph showing percentage gain in weight of specimens due to formation of rust

## Electrostatic Spraying in Porcelain Enameling

ONE of the more serious problems that has always confronted the porcelain enameling industry has been that of overspraying. Several years ago, the Harper J. Ransburg Company of Indianapolis, confronted with this same problem in the application of paints and varnishes, conceived the idea of applying the principles of electronics to automatic spraying and achieved a major success. As a result of their success in the application of organic coatings, it was logically reasoned that the possibilities pointed to the success of electrostatic spraying with inorganic materials.

Early in 1944, the Pemco Corporation of Baltimore became seriously interested in electrostatic spraying for use in porcelain enameling and determined to find out if the process would be of any value to the industry. In July of 1944, the equipment necessary for tests and experimentation was set up at the Pemco plant and a clearly defined program, under the supervision of the Pemco Research Division, was put into effect.

The technical data accumulated during these tests definitely proved that electrostatic spraying is satisfactory in porcelain enameling and, when properly used, a uniformly coated product with a minimum of overspraying is obtained.

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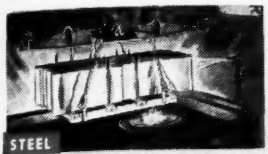

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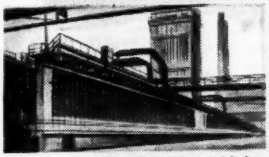

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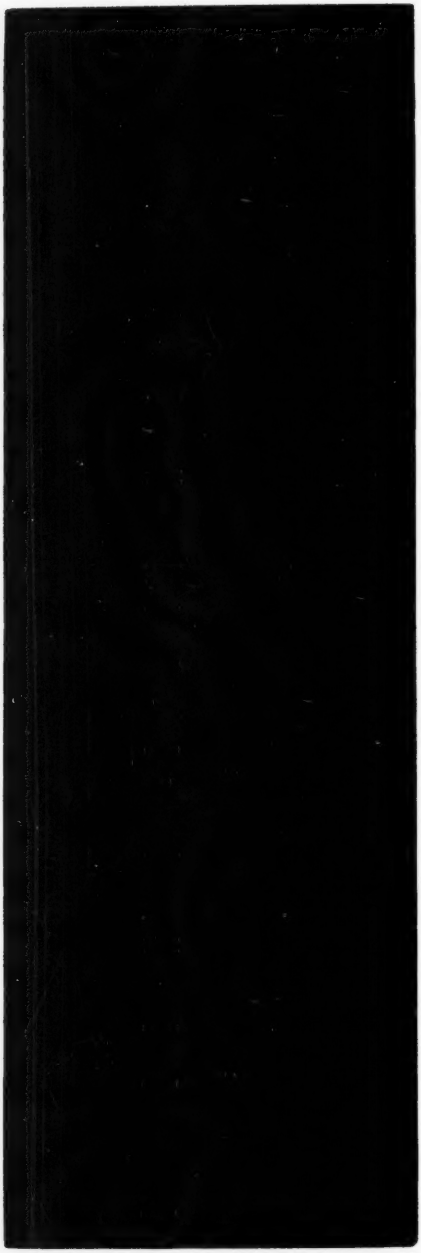

RESEARCH work becomes extremely valuable when the results can be used in a practical application after being found. Part I of this series explained and actually showed, (1) that iron oxides when on the steel surface as corrosion or scale carry iron into the galvanizing bath, (2) that the zinc being a powerful reducing agent at galvanizing bath temperatures reduces the oxides and forms the zinc-iron alloy known as "galvanizer's dross," and (3) that the liberated oxygen unites with the zinc of the galvanizing bath to form zinc oxide called in practice "oxide skimmings". This then brings us to the point where the actual operating conditions can be discussed with the idea of revealing the differences between the old muriatic acid fluxing technique still used in many plants, and the new liquid flux technique that is gradually being adopted just as soon as it is understood. The new liquid flux technique eliminates most of the troubles caused by the old technique and, in addition, greatly impoves the hot-dip galvanizing practice all along the line.

### There Are Two Operating Phases to Be Studied

The old muriatic acid dip flux technique includes two practical operating conditions as does the new liquid flux technique. The one condition is well illustrated by the range boiler and tank field of galvanizing. The actual galvanizing operations are clearly illustrated in Fig. 1. Some plants simply dry the tanks by placing them upon the galvanizing furnace until they are dry enough to put through the bath; others run them through a kind of oven with a gas flame under the plate, and the oven is covered but open at both ends. In still other plants, the tanks go into the flux without any heating at all and are fairly wet and cold. There are all stages of heating from actually "burning" the tanks in drying down to

tanks that are wet and perhaps only luke warm. This illustrates one set of conditions with the old muriatic acid dip fluxing.

The other set of conditions with the old muriatic acid dip fluxing is shown in Fig. 2, which illustrates the usual type of steel hot-plate dryer. The wide range of difference can be seen at once in these two sets of drying operations, both with the old muriatic acid dip flux. Small work of every type, kind, and description is dried on this type of hot plate dryer, including pipe fittings, washers, various kinds of small poleline hardware articles such as lag screws, pole pins, and in fact any small article.

### Sources of Iron in the Old Muriatic Acid Flux Technique

To fully appreciate the large amount of scientific knowledge involved to bring the galvanizing technique up to an entirely different method of drying and operating practice prior to the moment that the work enters the galvanizing bath, it is necessary to look at each step of the old flux technique to see just what has taken place. Let us commence with the black steel articles which are covered with the roll scale from rolling the steel base itself. The steel base is not only fairly heavy, but as a typical example in range boilers we also find that they are welded which puts on an additional scale or iron oxide that is very difficult to remove. All iron oxides and scales must be completely removed, and the base must be perfectly clean before it can be properly hot-dip galvanized.

Figure 3 shows a number of range boiler or heater tanks in a crate for pickling. The welded seams are clearly visible at the tops and down the bodies of the tanks.

In pickling off these scales, the first thing we have formed is ferrous sulfate. The iron goes into solution in the acid pickle and because of the hydrogen escaping up through the solution the iron stays in the ferrous state. Now, it must be kept in mind that the iron scale is being removed continuously, and therefore the ferrous sulfate in the bath constantly increases. This same condition holds in the old metalware field of galvanizing. Pails, tubs, ash cans, and so on, are all pickled under the same conditions, and ferrous sulfate is formed.

The fact of importance in this discussion is the removal of the solid iron in the form of scale, and its change into liquid iron as a ferrous iron salt. When this salt is hydrated, that is, carries water in chemical combination,

Fig. 1—Range boilers entering the slag flux on a hot-dip galvanizing bath *(Courtesy Day & Night Water Heater Co., Ltd., Monrovia, Calif.)*

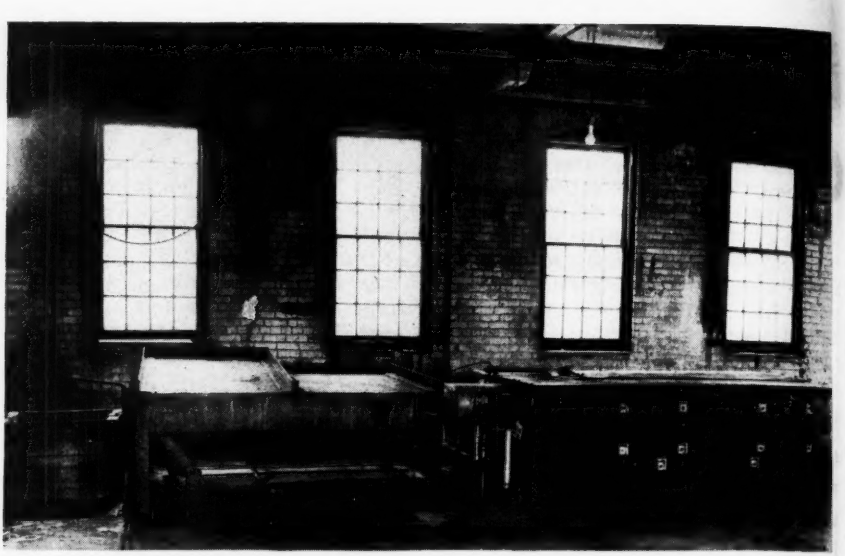

Fig. 2—The standard steel hot-plate dryer used in the galvanizing industry for drying malleable iron pipe fittings and all kinds of small work in job galvanizing
*(Courtesy The American Tinning & Galvanizing Co., Erie, Pa.)*

the color is green; when it dries on the tanks on the floor after being taken out of the pickle, it turns a white color, and in this condition is the dehydrated ferrous iron sulfate. Thus, the iron is carried on the surfaces of the tanks over to the next tank, which, for example, in metalware galvanizing, is the muriatic acid dip or flux dip before the articles are placed on the drain rack prior to galvanizing. It can readily be appreciated that as the tanks keep coming over to the muriatic acid dip covered with iron salts that these iron salts keep building up in the muriatic acid dip tank. The author has actually seen these iron salts so high that they crystallized as a heavy green deposit all over the outside of the muriatic acid tank. Tests have shown up to 10 per cent of iron salts. That means that the muriatic acid solution consists of three components — muriatic acid, ferrous sulfate, and ferrous chloride.

### The Muriatic Acid Flux Dip Has a Covering of Iron Chloride

A fact which was not realized for many years, and still is not known in many plants today, is that the effectiveness of the muriatic acid flux dip is not due to the acid at all, but to the fact that the muriatic acid solution in reality becomes a ferrous chloride or iron salt dip, and it is this covering of iron salts over the surface that is the flux and not the muriatic acid. This fact is readily proved when a new muriatic acid dip solution is made.

The "old timers" were smart enough to save some of the saturated solution from what was emptied out in order to retard corrosion enough until more iron salts built up in the new solution to afford effective iron salt covering. The mechanics, or chemistry, of the fluxing action involved is that the iron chlorides cover the surface, and first very slowly the water is lost by simply

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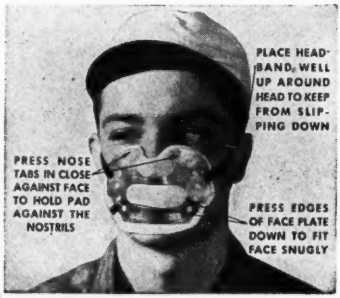
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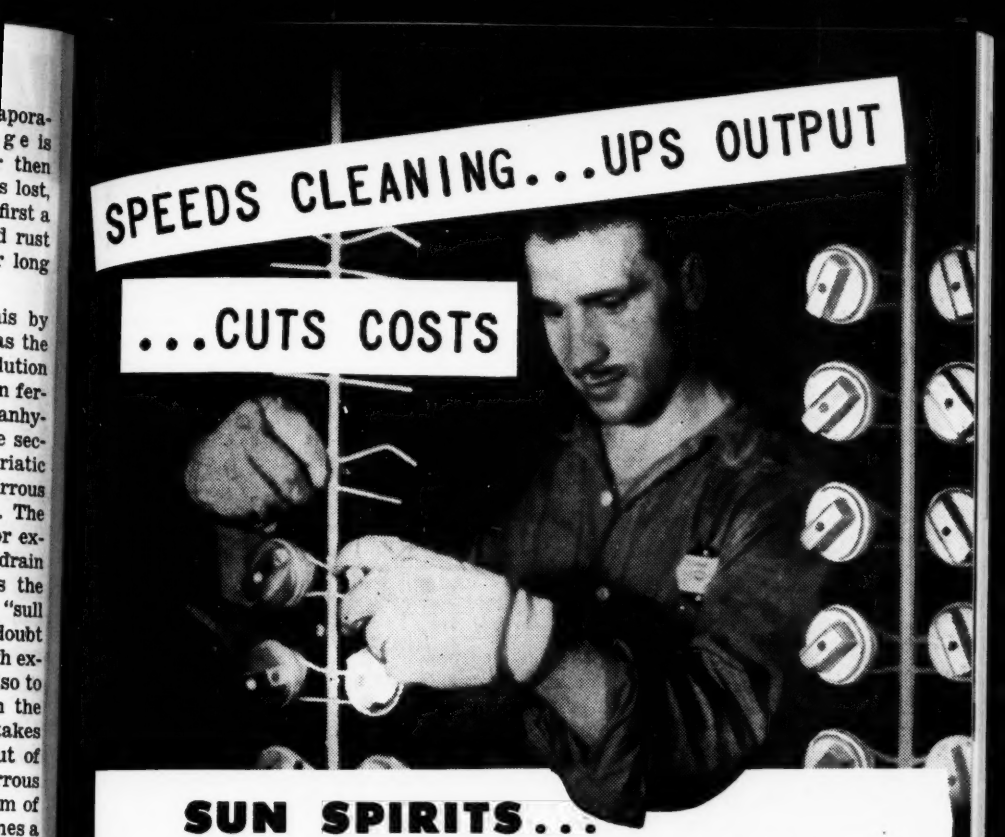
being exposed to the air or evaporation. However, as the dry stage is reached, the oxygen of the air then goes to work and the chlorine is lost, the oxygen replacing it to form first a yellow sull rust, and finally, red rust if allowed to stand in the air long enough.

Consequently, if we trace this by stages, we have the first stage as the iron salts of the pickling solution which is either the hydrous green ferrous iron sulfate or the white anhydrous powdered iron sulfate. The second stage is the salts of the muriatic acid tank which are both the ferrous sulfate and the ferrous chloride. The third condition is the air stage or exposure to the atmosphere on the drain rack. This third stage produces the yellow ferric oxide known as "sull rust", ferric hydroxide, and no doubt ferric carbonate if left long enough exposed to the air. It is important also to call attention to the fact that in the third stage another change takes place; namely, the iron comes out of solution and changes from the ferrous iron to the ferric iron. In the form of ferric iron, or ferric oxide, it becomes a solid, and when it dries as rust, it looks like dirt.

These first three stages or conditions are familiar to all galvanizers. However, there is a fourth condition, which has been discovered to be the real troublemaker. That condition is the hard red rust or the "burned" iron oxide crust or covering that forms on the surface of the articles in drying. The hotter the dry plate and the longer the articles stay on it, the harder the rust is formed. It may actually be "burned" to a very hard red rust if the dry plate is hot enough, and one dry plate that the author tested showed a heat of almost 600 deg. F. All of the articles were corroded in drying. Those at the bottom of the pile were "burned" to a heavy tight red rust; those at the top

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first steamed, and then turned green, and finally they too became covered with rust. Thus, the fourth stage, or the dryer stage, may produce yellow rust, red rust, or deep brown rust. These are all ferric oxide with varying amounts of chemically combined water.

In Part I of this series it has been definitely proved that iron in any form on the surface of the articles entering the hot-dip galvanizing bath will be reduced by the molten zinc, the iron forming zinc-iron alloy (dross) and the oxygen forming zinc oxide (oxide skimmings). Thus, the outstanding scientific facts of the old muriatic flux dip are: (1) Its value depends upon a salt covering of iron chloride (a saturated solution of iron salts); (2) That while ferrous chloride covering retards corrosion until the article is galvanized, still the iron salt protective covering produces both dross and oxide skimmings and hence is very detrimental to operating efficiency and galvanizing costs. It can now readily be seen that a very large part of the iron removed when the scale is dissolved is carried in the soluble form from one solution over to the next and finally into the galvanizing bath where the molten zinc reduces the iron salt compound, forms a zinc-iron alloy (dross) with the iron, and forms zinc oxide (oxide skimmings) with the oxygen released. To make matters worse and multiply the trouble, the dross as formed settles to the bottom of bath where as it lies dead, accumulates heat and makes more dross.

The important facts therefore to remember about the old muriatic acid dip flux is that its success depends upon a heavy covering of iron salts over the surfaces of the articles, and that this iron salt is both a dross producer and an oxide skimming producer.

### Basis of New Liquid Flux Technique Is the Elimination of the Iron Salt Protective Coating

As soon as it was discovered that iron salts from the pickling baths and that iron salts and iron oxides from corrosion on the dryer were the major sources of the iron to make dross, research work was immediately started to find a substitute to protect the surfaces of the articles, and yet at the same time would not be an iron salt, an iron oxide, or any form of iron to find its way into the flux box and galvanizing bath and eventually, of course, to make dross.

Scientific advances in industry come very slowly, and it takes many years sometimes for them to become "practice." The beginning of the liquid flux technique dates as far back as 1920 but it did not become perfected until

Fig. 3—Pickling heater tanks in sulfuric acid
*(Courtesy Day & Night Water Heater Co., Ltd., Monrovia, Calif.)*

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at least 10 years later, although research work and tests both in the laboratory and in practice were being carried on continually in between time. The original ideas involved were to improve the sal-ammoniac slag flux on the galvanizing bath and reduce fumes, but this was later on extended and broadened by various tests and research work.

At first, the old standard tinning flux was tried, which is merely muriatic acid cut with a slab of zinc and then "white fines" (fine white sal-ammoniac or ammonium chloride) added to the liquid zinc chloride. The basic idea involved was that of substituting zinc chloride for iron chloride as a protective covering, although many factors of what was actually involved were not understood. It was soon found that simply substituting zinc chloride for iron chloride was not enough; that even with this change, corrosion and rusting in drying still persisted. About 1929 the double salt—zinc ammonium chloride—was used in place of the zinc chloride obtained by cutting acid and then adding the white fine pure ammonium chloride. Even the substitution of the double salt was not entirely successful since if the ratio of the two component parts, zinc chloride and ammonium chloride, is not right, even then corrosion on drying takes place.

### Many Minor Adjustments Had to Be Made in Practice

To see the liquid flux technique working successfully in a hot-dip galvanizing plant today would impress one as though it were really a very simple operation. To the contrary, it is not only not simple, but it is actually very complicated. For example, the technique cannot be operated successfully with an open steam line for heating purposes. In the old days, all solutions were heated with open steam lines, so that here right at the beginning was a radical change, and it is not an easy matter to get industry to accept some radical change from the routine accepted practice. Probably the worst disadvantage that held back the practical development of the liquid flux technique was the fact that muriatic acid at that time cost less than a cent a pound and zinc ammonium chloride salt cost at least ten times as much. At the beginning, to make it more difficult, sal-ammoniac was the standard galvanizing flux material and no chemical manufacturers even made the double salt zinc ammonium chloride, at least for that purpose.

Then, it became a question of what proportions the double salt should be —how much ammonium chloride and how much zinc chloride. Research investigations indicated that when the ammonium chloride was too high and the zinc chloride too low, that corrosion on the dryer occurred. Finally, it was found by practical tests and actual trials that a proportion of 3 to 1 afforded the best operating results. Even then much difficulty was encountered.

Some installations of the new technique produced excellent results; others were a complete failure. And while it all seems so easy and clear now, then it was a case of patiently searching and running down the trouble. Saturation and temperature of the liquid flux solution were found to be extremely important. The saturation that worked successfully in one field of galvanizing would not give satisfactory results in another field and there are many cases on record where the new technique even in the same fields of galvanizing worked successfully in one plant and not in another. Thus, we see a long tedious fight to really put the liquid flux technique into service, and even today there are not 50 per cent of the hot-dip galvanizing plants in the country using this new technique.

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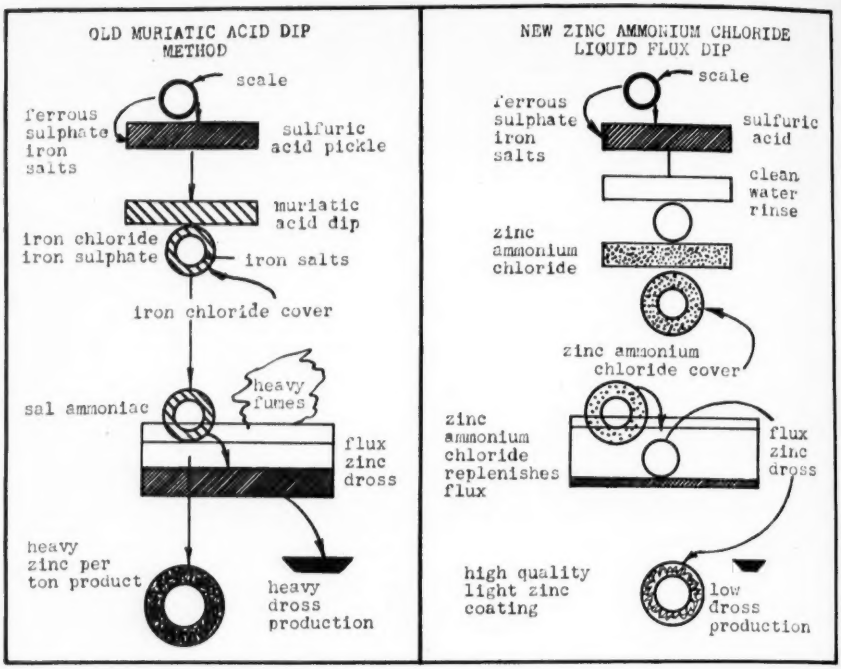


**Fig. 4—Diagramatic sketch of the old muriatic acid dip fluxing and the new zinc ammonium chloride liquid flux practice**

there was no washing after pickling. The articles were simply pickled, lifted from the sulphuric acid tank, and put into the muriatic acid tank, and then up on the drain rack or dryer as the case may be. Thus, the iron salts accumulated by all the iron pickled off as scale were merely carried from one tank to the other, and finally out on the surface of the work as iron chloride and iron sulfate. It took some time for the air to break down the iron chloride and change it to the yellow sull rust or iron oxide. However, when the work was small and it was dried on the old steel dry plate, the heating was fast. The work steamed and first turned green then yellow, and, if the dryer was too hot, finally "burned" to a dark red rust. Continued "burning" produced a hard brown rust that slowed down production materially, and was the direct cause of a very high percentage of bare and exposed steel spots, and worse yet, because of the excessively long submersion time in the molten zinc bath, especially with malleable iron pipe fittings, the dross production was excessively high.

All of these conditions are explained because many of them actually still exist today, since an extremely large number of hot-dip galvanizers still cling to the old muriatic acid dip flux. Cases of corrosion on the dryer have found to be so bad that operations simply had to be stopped until something could be done about relieving the condition. Since many galvanizers do not know or understand why the liquid

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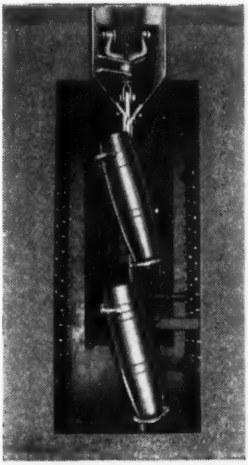

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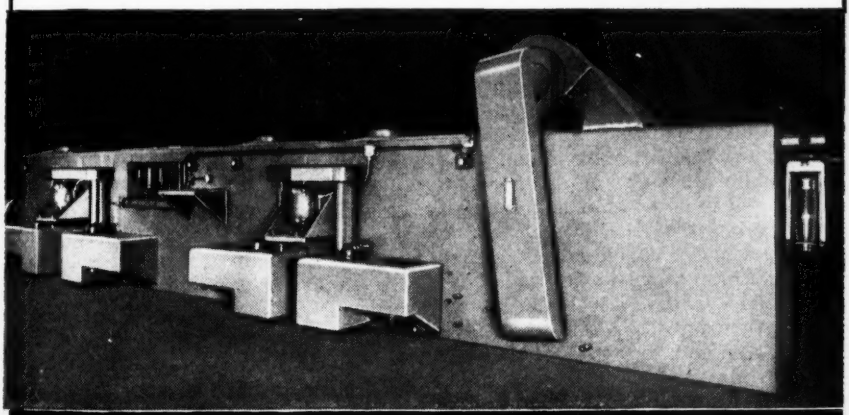

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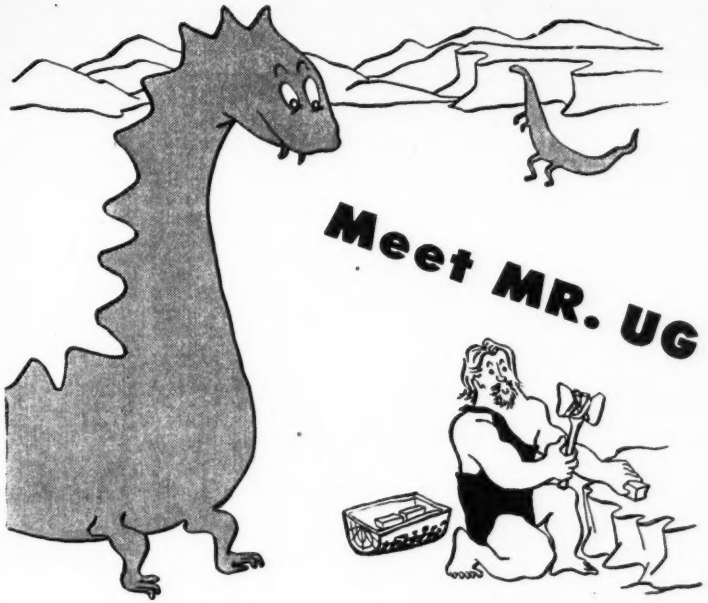
flux technique should be used, or why it is better and more scientific than the old muriatic acid dip practice, this article has attempted to explain the differences between the old and the new flux techniques. And in addition to clearly showing why the liquid flux technique should be adopted, a still further improvement in the galvanizing technique is suggested; namely, to eliminate the old steel hot-plate dryer. However, this cannot be done until the new liquid flux technique replaces the old muriatic acid dip flux method. This next stage of development has been made possible by the introduction of the liquid flux technique, and is a logical advance in method, equipment, and practice when the new flux technique is used. The author, who is the sponsor of this new hot-air drying technique to replace the old steel hot-plate dryer, has tried to present visually just what happens in replacing the old muriatic acid dip by the new liquid flux technique.

This in itself is an enormous advance in progress over the old flux technique, but the more important fact is that it is a step in scientifically improving the galvanizing practice so that it is possible to advance still another step, and eliminate the old steel hot-plate dryer. Figure 4 shows diagramatically the chemical and mechanical operation of the old muriatic acid dip flux technique and the new liquid flux technique using the double salt, zinc ammonium chloride. It will be noted at once in the first flux practice that the protecting film is iron chloride, which salt is carried straight through on the surface of the work and eventually into the molten zinc bath where it is reduced by the molten zinc and goes to the bottom of the bath as the zinc-iron alloy called galvanizer's dross. It will also be noted that heavy fumes are given off from the galvanizing pot and, in addition, that many defects readily result from that method of fluxing.

In contrast to the iron chloride salts as a protecting covering, when zinc ammonium chloride is used, we find first the iron salts developed in pickling are all washed off the work and the surface is clean before the article goes into the liquid flux solution. It then receives a film of zinc ammonium chloride over the surface which protects it from corrosion while draining and drying. The zinc ammonium chloride helps to recondition the slag on the hot-dip galvanizing bath by continually refreshing it with new flux carried over on the surface of the work. The surface of the work enters the zinc absolutely clean and with no available iron of any kind to form dross (zinc-iron alloy).

Figure 4 shows clearly that with the new liquid flux technique no iron of any kind finds its way into the molten zinc bath and, in addition, because each particle of iron base metal carries its own flux right above it there are no seconds, no rejects ,and almost no work that has to be re-galvanized. In other words, if the pickling and cleaning operations are carried out correctly and the fluxing is performed properly, a fine high quality galvanized product is assured. It is to be noted that all of the defects of the old muriatic acid dip flux technique are eliminated. Attention is also called to the fact that the dross is greatly reduced since the iron to make it is eliminated. In addition, because the zinc is cleaner and carries less iron, the zinc per ton of product is also greatly reduced and the quality of the product greatly improved.

Even today few can explain why an old iron saturated muriatic acid flux will protect the iron, and yet when a new flux is made up with new muriatic acid, the surface will rust and corrode if some of the old acid is not added to the new muriatic acid tank. This is be-

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cause the technique is based on the protection by iron chloride salt, and, when a new muriatic acid dip is made up, there are no iron salts in it and consequently there is not only no protection for the surface, but an actual acceleration of corrosion in the attack of the muriatic acid when exposed to the additional affect of the air.

However, important as the new liquid flux technique is, corrosion is still possible when the old steel hot-plate dryer is too hot. The author actually found a dryer that showed 562 deg. F. of heat, and all of the work on it was rusted and corroded badly during drying. The next article in this series will discuss an additional improvement in galvanizing practice made possible by the new liquid flux technique.

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**"Refresher Course in Porcelain Enameling."** The Enamelist Magazine, 4150 56th St., Cleveland 5, Ohio, announces the publication of a "Refresher Course in Porcelain Enameling." The contents cover design, metal preparation, application, plant troubles, and process control. The price is $1.00 per copy.

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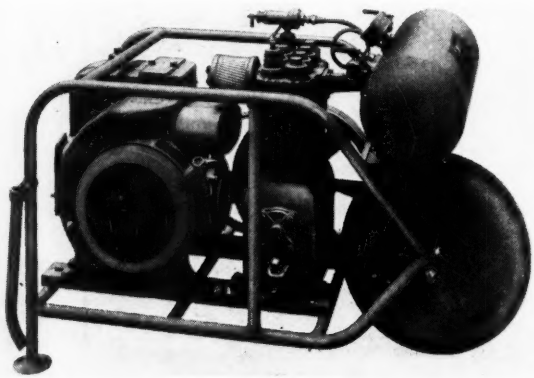

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Spraying equipment of Binks Model E-2 Portable Spray Outfit. This equipment consists of two Thor Model No. 17A spray guns, two pressure tanks complete with regulators, as well as a set of connecting hoses. The smaller chest contains tools, accessories, and replacement parts.

•

and a set of hoses to interconnect the above equipment and to connect it to the air compressor. A smaller chest which fits inside the larger one contains two Thor Model 17A spray guns for applying the paint; a set of tools necessary for making minor adjustments and repairs; a set of accessories for holding the fuel and the grease necessary for proper operation; and a set of parts to replace those most likely to wear or be damaged in use.

The pressure tanks hold the material, providing a means to keep it mixed, and feed it to the guns at a constant pressure. The extension device is attached to the spray gun in place of the standard air and material nozzles and the air atomizes the material in the nozzles of the extension

# Bright Alloy Plate

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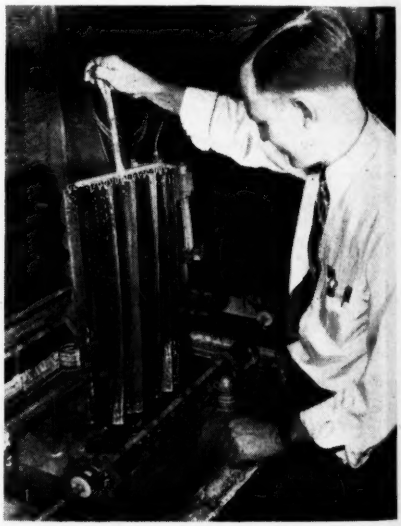


COPPER bands destined for vital war instruments are shown here being withdrawn from plating bath by George W. Jernstedt, research engineer in the Westinghouse Meter Division and inventor of a new alloy plating process. The new plate, called bright alloy, protects instruments against corrosion and tarnish caused by climatic conditions of such battlegrounds as the tropical islands of the Pacific.

Made of copper, tin, and zinc, bright alloy holds great promise for improving and protecting many peacetime products. Mirror-like in appearance, the new plate is said to resist corrosion even after being showered continuously with salt spray for more than 200 hours.

TANK FOR PICKLING STEEL
Typical construction of tanks used by "The Nation's largest hot-dip-galvanizing shop"
ASPHALT TYPE MEMBRANE
PENCHLOR ACID-PROOF CEMENT
ACID PROOF BRICK

**When steel plates are pickled, prior to galvanizing, in 10% sulphuric acid at 180° F., corrosive action is severe. The tank shown above is lined with a double course acid-brick, laid entirely with Penchlor Acid-Proof Cement, which gives corrosion protection and also withstands the physical abuse resulting from submerging and withdrawing steel plates in this solution.**

## PENCHLOR

Reg. U. S. Pat. Off.

## Acid-Proof Cement

**. . . sets quickly, reducing construction delays. It is a self-hardening sodium silicate type cement and has exceptionally long life, as proved in hard service and under severe acid conditions. It is unaffected by *all acids*—hot or cold—dilute or concentrated—except hydrofluoric acid.**

**Penchlor Acid-Proof Cement, used as a mortar, adheres strongly to brick, steel, glass, lead, rubber and asphalt. Write today for further information.**

***OUR LONG EXPERIENCE WITH CORROSION PROBLEMS QUALIFIES US TO OFFER OUR RECOMMENDATIONS IN A WIDE VARIETY OF CONSTRUCTIONS. WRITE US ABOUT YOUR PROBLEM—NO OBLIGATION!***

**SPECIAL CHEMICALS DIVISION PRODUCTS**
**Acid, Alkali, and Solvent proof Cements • Lead Fluoborate Concentrates • Fluoboric acid • Acid, Alkali and Solvent Emulsion Type Cleaners • Paint Strippers • Pickling Agents.**

**Special Chemicals Division**
**PENNSYLVANIA SALT MANUFACTURING COMPANY**
*Chemicals*
**1000 WIDENER BUILDING, PHILADELPHIA 7, PA.**
NEW YORK • CHICAGO • ST. LOUIS • PITTSBURGH • CINCINNATI • MINNEAPOLIS • WYANDOTTE • TACOMA

SPECIAL CHEMICALS DIVISION
PENNSYLVANIA SALT MANUFACTURING CO.
Dept. PF, 1000 Widener Bldg., Phila. 7, Pa.

I would like to have a free copy of your booklet No. 6 on Penchlor Acid-Proof Cement.

NAME _____
TITLE _____
COMPANY _____
ADDRESS _____

head, ejecting it in the form of a fan spray.

The compressor unit includes an air compressor with an automatic unloader, a gasoline engine, a wheelbarrow frame, and an air receiver tank. This tank stores air at a pressure up to 90 lb. per square inch and removes the pulsations from the air before it goes to the spray gun.

The spray process of painting is credited with aiding and speeding the tremendous war production with which American industry surprised the world. Not only the Army personnel trained in this method but industry itself will demand that spray painting be used to speed reconversion of war plants to peacetime use and its applications extended in the future.

---

**"Color Code for Safety"** is the title of the 16th folder in the Color Facts series issued by the Eagle Printing Ink Co., Div. of General Printing Ink Corp., 100 Sixth Ave., New York 13, N. Y. The Du Pont Code illustrated in the folder affords an opportunity to standardize safety practice and to allow industry at large to benefit from a uniform and meaningful symbolism. Copy of folder free upon request.

---

**Hercules Products.** A 36-page booklet listing Hercules chemicals and industrial explosives and approximately 50 industries which they serve has been issued by the Hercules Powder Co., Inc., Wilmington, Del. In a manner designed for easy reference, the products are first indexed according to various industries in which they are used and then according to chemical families. An indication of many postwar applications for Hercules chemicals in plastics, paints, adhesives, and so on, is given by the booklet.

Chemicals in the cellulose family, rosins and modifications, rosin esters and synthetic esters, terpene solvents and chemicals, explosives, and blasting supplies are among the products which are discussed in the booklet, copy of which is available to executives free upon request.

# A FAST, ECONOMICAL, SAFE PROCESS

Blakeslee "Solvent Vapor" degreasing cleans and dries metal in one operation—ready for plating, painting, enameling, heat-treating, etc. All types of metal parts from stampings to threaded pieces are handled with speed, economy and saftey. *There are no fire hazards, no extra drying required and no more rejects.*

Why not talk over your degreasing problems with one of our men? Whatever your needs may be—or the difficulties of application—there is a size and type of Blakeslee equipment that will do the job for you. Write today for a free copy of our new booklet, "Solvent Degreasing."

**G. S. BLAKESLEE & CO.**

**Main Office and Plant: Cicero Station, Chicago 50, Illinois**
**New York** **Toronto, Ont.**

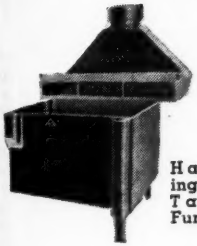
**BLAKESLEE**
*Solvent Vapor* **DEGREASERS**
**Metal Parts Washers**

**Standard Units and Specials ENGINEERED for YOU**

# HAVEG *tanks*

## NOW BEING SHIPPED

## In 6 to 8 Weeks



Haveg Etching or Plating Tank with Fume Hood.

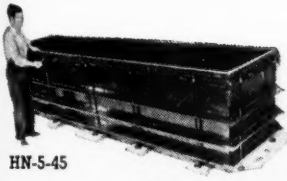
The production of HAVEG Chemical Equipment is now on such a favorable basis that tanks . . . standard or special . . . rectangular or cylindrical . . . can be shipped in 6 to 8 weeks.

### *Piping . . . Valves . . . Fittings from Stock*

Haveg Pickling Tank with Fume Duct Attachment.

HAVEG Chemical Piping . . . in standard sizes ½" to 12" is now available from stock. Fume Duct in standard sizes 2" to 36" can be supplied promptly, but is made to order.

HAVEG is a strong, tough plastic. It may be used in continuous service at boiling temperatures, and is unaffected by rapid temperature changes. HAVEG is unaffected by all chemicals commonly used in plating, pickling and cleaning—except for oxidizing acids like chromic and nitric.



HN-5-45

Haveg Pickling or Plating Tank, One Piece Seamless Construction.

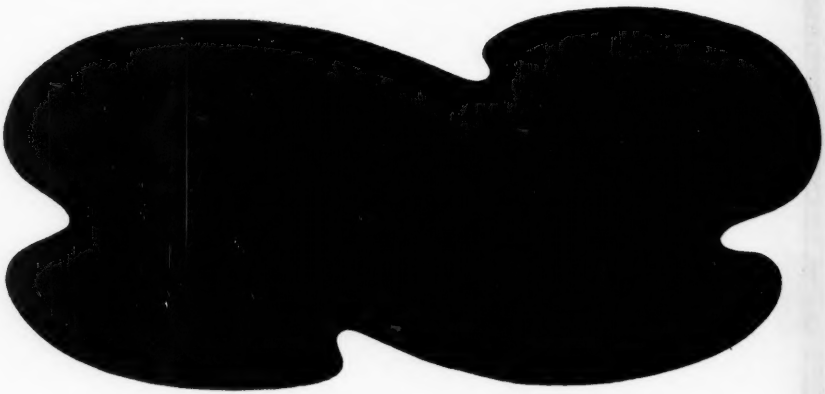
*Bulletin F4 gives complete data on chemical resistance and design. Wire, phone or write today for prices and delivery.*

**HAVEG CORPORATION**

**NEWARK 67, DELAWARE**

FACTORY — MARSHALLTON, DELAWARE

| CLEVELAND 14 | CHICAGO 11 | DETROIT 11 | LOS ANGELES 13 |
|---|---|---|---|
| 550 Leader Building | 1201 Palmolive Building | 2832 E. Grand Blvd. | 601 W. Fifth St. |



TYPICAL of plants employing power brushing is the Packard Motor Car Company, Detroit, Mich., where brushing is employed to remove burrs after machining operations, remove scratches and other surface blemishes after grinding operations, and clean and polish parts. In its widespread use of power brushing, Packard discovered a new application for wire brushes in connection with the production of Rolls Royce aircraft engines.

The Osborn Master Wheel Brush illustrated herewith is the type used for removing carbon from aircraft engine valves at Packard Motor Car Company. An adapter is shown being snapped into the standard 2-inch opening of the brush to allow for its use on a small diameter arbor.

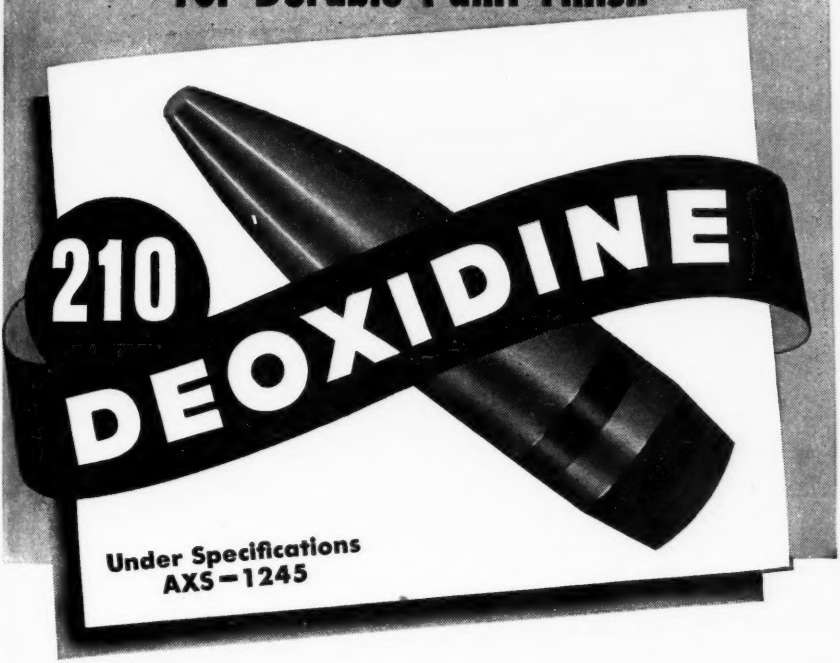
Power brushing is employed to remove carbon deposits in the valves of the engines between the first and final run on final test operations. A standard bench grinder is used to hold the brush and the valve is held against the whirling brush by the operator.

Produced by The Osborn Manufacturing Company, Cleveland, Ohio, the Osborn Master Wheel Brush employed is 8 inches in diameter, has a brushing face width of 1⅜ inches, and is mounted in three sections. The steel wire sections are locked into the hub under tremendous pressure and the wire in the brush is crimped to reduce breakage. The brush, rotating at 3,450 revolutions per minute, readily removes the carbon from the valve stem and the top of the valve.

★ ★ ★

BUY A WAR BOND TODAY

# To Properly Clean and Condition Metal For Durable Paint Finish



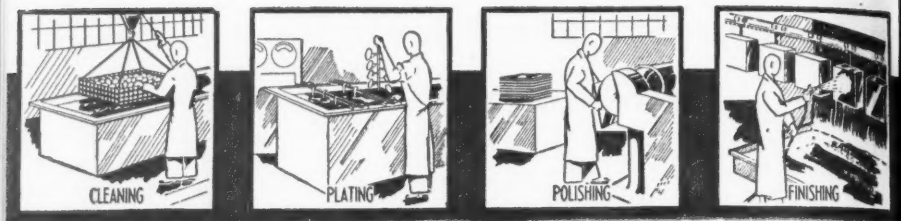

210 **DEOXIDINE** Cleans and Conditions *simultaneously*. Light cutting oils are removed and the surface properly conditioned for painting at the same time.

The detergent properties of 210 **DEOXIDINE** are superior to alkali and eliminate the danger of leaving paint-removing, bond-destroying alkali residues on cleaned metal surfaces.

No special equipment is required; any three-stage spray washer is adequate or 3 steel tanks for dip operation. Mild steel equipment throughout is satisfactory—stainless steel may be used, but is not required.

The ACP Company—Technical Department—will gladly consult with you and advise regarding proper chemicals to use in rust removing and metal cleaning both for war products and those for domestic use. Address Dept. A-4.

AMERICAN CHEMICAL PAINT CO.
AMBLER ACP PENNA.
MANUFACTURERS OF INHIBITORS AND METAL WORKING CHEMICALS




# News of the Industry

## Porcelain Enamel Institute Meets

Pictured herewith are members of the Market Research Committee of the Porcelain Enamel Institute in their first and only 1945 meeting, held recently in Pittsburgh. In line with the recent request of the Office of Defense Transportation, future meetings will be continued by mail.

Shown are, left to right (seated), B. J. Birdwell, Porcelain Metals Corp., Louisville, Ky.; Chairman Robert J. Ritchey, Carnegie-Illinois Steel Corp., Pittsburgh, Pa.; Edward Mackasek, Managing Director, Porcelain Enamel Institute; Herbert R. Turk, Pemco Corp., Baltimore, Md.; (standing) George S. Blome, Baltimore Enameling Co., Baltimore, Md.; Floyd C. Woleslagle, Carnegie-Illinois Steel Corp., Pittsburgh, Pa.; John F. Sweeny, Walker & Downing, Pittsburgh, Pa.; and F. L. Meachem, Chicago Vitreous Steel Products Co., Chicago, Illinois.

Fred Ingram of the Ingram Richardson Mfg. Co., Beaver Falls, Pa., was not present when the picture was taken.

Market Research Committee

## Enthone Appointed Sales Agent and Distributor

The Daniels Plating Barrel Co., 129 Oliver St., Newark 5, N. J., manufacturer of electroplating equipment, announces the appointment of The Enthone Co., 443 Elm St., New Haven 2, Conn., as exclusive sales agent and distributor of Daniels plating barrel equipment in the New England territory. The territory embraced by this agreement includes Maine, New Hampshire, Vermont, Rhode Island, Massachusetts and Connecticut.

The Enthone Company maintains complete laboratory facilities staffed by efficient technicians to supplement sales and equipment of the Daniels plating barrel line.

# THE BURRS COME OFF
# QUICKLY...ECONOMICALLY

Yes, you can remove burrs with hard burring tools but how often do you take off too much metal? Or you can use a hand file or emery cloth but isn't that rather slow and expensive?

Why not do as White Engineering Company of Baltimore does on its many sizes and shapes of die-castings? It uses the Lea Method and properly selected Lea Compositions on flexible buffs and bobs. Why not burr, polish and buff as countless other plants?

Send us a complete description of the part or parts for which you would like our recommendations for more effective and cheaper de-burring or other finishing operations. Better yet, if possible, send us the parts. Our technical staff and laboratory will be glad to study your problem and make a complete report. If necessary, we'll send a representative to your plant.

## THE LEA MANUFACTURING CO.

**Waterbury 86, Conn.**

***Burring, Buffing and Polishing . . . Manufacturers and Specialists in the Development of Production Methods and Compositions***

## Detrex Executives Promoted

A. O. Thalacker has been elected vice president and general manager of the Detrex. Corp., Detroit, manufacturer of industrial cleaning equipment and chemical cleaning compounds. Mr. Thalacker joined the organization in 1937 and since

A. O. Thalacker

that time has held the executive positions of assistant secretary and secretary, which office he held prior to his recent promotion.

E. W. Allison, who has been in the legal department of the firm since 1941, is now secretary. In his new office, Mr. Allison has supervision over the legal and personnel divisions of the firm. Through his efforts, an efficient personnel department was established and particular emphasis given to first aid and care of Detrex employees in offices as well as shops.

## Nutmeg Chrome Plating Company

A. W. Logozzo announces the formation of the Nutmeg Chrome Plating Company at 343 Trumbull St., Hartford 3, Conn. The company will be devoted to the production of hard chrome specialists, including gages, dies, tools, plastic molds, and machine parts.

## Georgi Joins Pennsalt

Edmund A. Georgi, formerly manager of technical development, Papermakers Chemical Department of the Hercules Powder Company, has joined the Pennsylvania Salt Manufacturing Company as director of the Special Products Division. This division conducts laboratory and field work in the evaluation of new products and in carrying out service duties requested by sales or manufacturing departments.

## Du Pont Technical Division

F. S. MacGregor, general manager, Electrochemicals Department of E. I du Pont de Nemours & Co., announces the formation of a Technical Division with Donald O. Notman as director. In the new division, Dr. C. W. Tucker, formerly Peroxygen Products manager in the Sales Division of the department, will be chemical director. Dr. Sterling Temple, who has been chemical director of the department, will be special assistant to Dr. Tucker.

All research and semi-works activities of the Electrochemicals Department will be coordinated in the new Technical Division, with headquarters in Wilmington, Delaware.


**CLEAN, SMOOTH THREADS**

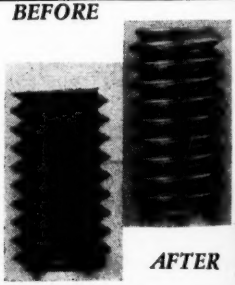
Use Roberts Burring Compond for • Faster production • Complete contacting of all irregular contours due to flexibility of wheels • Smooth, clean work and good color • Preserves all essential dimensions.

*Write for samples and suggestions.*

**ROBERTS ROUGE CO.**

STRATFORD • CONNECTICUT

*BEFORE*



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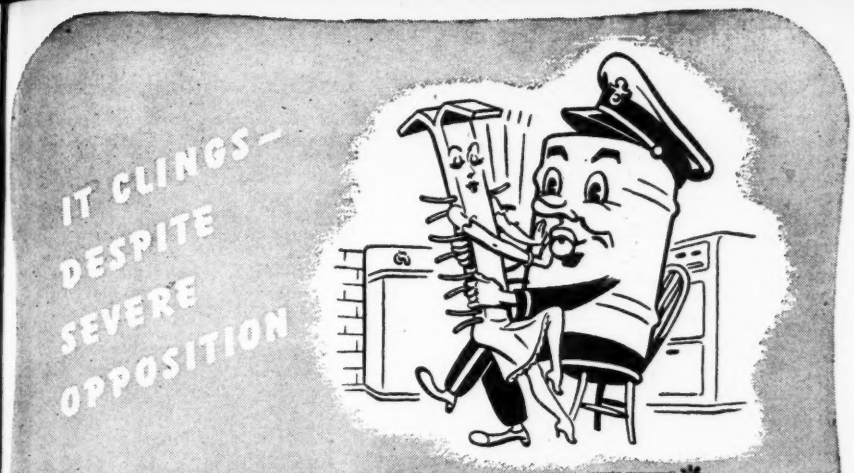



# UNICHROME*

## COATING 202

## *Gives Extra Protection in Strong Plating Baths*

With Unichrome Coating 202 on your racks, even the toughest solution won't get to first base. Especially durable when force dried, it sticks to plating racks and fixtures *longer*—resisting even severe anodizing baths and strongly alkaline solutions. What's the reason? It's formulated of special resins that have shown maximum chemical resistance under actual shop conditions.

And although these resins are in great demand for other war uses today, there's been no change whatever in our formula. So start using this current-saving insulation now. Write for prices or a trial order.

* Reg. U. S. Pat. Off.

**PROPERTIES**

**Chemical Resistance**—Excellent for all plating cycles.

**Toughness**—Withstands repeated flexing and shop handling—cuts cleanly and easily at contacts.

**Drying**—Dipped at room temperature in container in which it is shipped—force dried at 200°F. for extra protection.

**Adherence**—Excellent for severe cycles. For moderate cycles "Air Dry" Coating is recommended.

**UNITED CHROMIUM, INCORPORATED**

**51 East 42nd St., New York 17, N. Y. • 2751 E. Jefferson Ave., Detroit 7, Mich. • Waterbury 90, Conn.**

**Unichrome "Air Dry" Rack Coating**—a rack insulation that can be dipped and dried at room temperature, for use in all plating solutions

**Unichrome Quick Dry Stop-Off 322**—for cyanide copper and other plating work requiring an extremely adherent stop-off

**Unichrome Quick Dry Stop-Off 323**—for chromium and other plating work requiring a stop-off that can be peeled off after use.

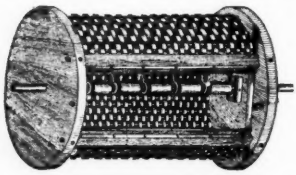
**Unichrome Resist**—a solid insulating material for constructing composite racks, stop-off shields, insulating gaskets, etc.

## A.E.S. Annual Banquet

The Milwaukee Branch of the American Electroplaters' Society will hold its annual banquet and educational meeting on Saturday, April 29, 1945, at the Schroeder Hotel. The following papers are to be presented: Electroplating Technique by F. Savage, C. G. Conn, Ltd., Elkhart, Ind.; New Rapid Nickel Plating by Walter Pinner, Houdaille Hersey Corp., Detroit, Mich.; and Finishing of Army Ordnance by J. R. Devlin, Milwaukee office.

## Carlson Appointed Sales and Service Engineer

An announcement has been made by M. H. Corbin, vice president and director of sales of Standard Varnish Works, of the appointment of E. M. Carlson as sales and service engineer of the Eastern Pennsylvania territory. Mr. Carlson brings to his new position a broad background of experience in protective coatings for industrial applications. His headquarters will be at 800 Warren St., Willow Grove, Pennsylvania.

**Get New Catalog**

**KING PLATING BARRELS**

King White Oak Machine Woven White Oak Plating Barrels have many advantages not found in other plating barrels.

*Write for new illustrated catalog. It tells of their many money and time saving features.*

**JOHN KING** 48 SPRINGFIELD ST. DAYTON 3, OHIO


## Oakite Technical Director

Dr. Donald Price, formerly associated with the Interchemical Corporation and National Oil Products Company, author of many technical papers on organic chemistry, and well known for his research work on sulphonated oils, wetting agents, and detergents, has been appointed technical director of Oakite Products, New York, N. Y., manufacturer of specialized industrial cleaning materials.

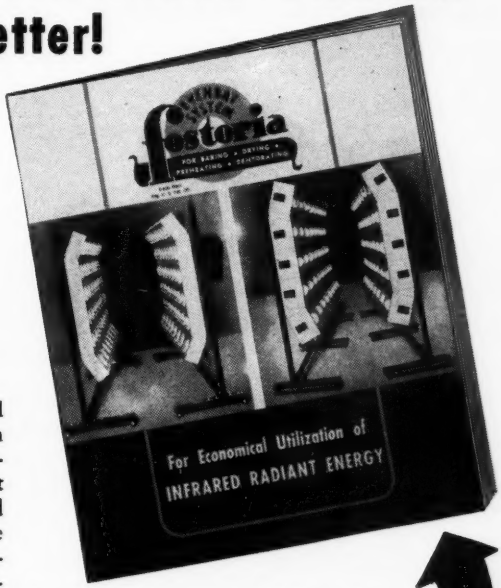
Dr. Price will direct the activities of the company's chemical and engineering staff and research laboratory in connection with plans to expand its technical service facilities to all branches of the metal-working industry and in the further development of materials designed for the improved surface preparation of metals. Dr. Price is vice president of the American Institute of Chemists, councillor of the American Chemical Society, member of the Executive Committee, American Branch, American Institute of Chemists, and various professional societies.

Dr. Donald Price

## Reese Returns to Inco

Donald J. Reese, who has been with the Steel Division of the War Production Board at Washington, D. C., since April, 1942, has resumed his duties with the Development and Research Division of The International Nickel Company, Inc., New York, T. H. Wickenden, manager of that division of the company, announces.

# *How to*
# BAKE—DRY—DEHYDRATE—PREHEAT
# Faster and Better!

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## FREE BOOKLET
*today!*

Thousands of industrial operations have been greatly speeded and improved by the efficient utilization of Infrared Radiant Energy with the Evenray System. A valuable new book which explains the development, application and utility of this modern industrial tool is now available on request. Send for a free copy, today. This factual information in your hands will point the way to amazing benefits for your production. Case history information directly applicable to your operations will be included if you send us general facts about your baking, drying, dehydrating or preheating job.

**FOSTORIA INDUSTRIAL SERVICE**
FOSTORIA, OHIO
INDEPENDENTLY AFFILIATED MANUFACTURERS

*Southern Industries, Inc.*
*Atlanta, Ga.*
*Amalgamated Elec. Corp., Ltd.*
*Toronto, Canada*

Highest Efficiency in the Utilization of INFRARED RADIANT ENERGY

EVENRAY SYSTEM
fostoria
FOR BAKING • DRYING • PREHEATING • DEHYDRATING

NEMA

Trade Mark Reg. U. S. Pat. Off

## MacDermid Technical Sales Engineer

MacDermid, Inc., Waterbury, Conn., announces the appointment of Arthur R. McNeil as technical sales engineer for southern Connecticut. Mr. McNeil is in his second year as president of the Bridgeport Branch of the American Elec-

Arthur R. McNeil

troplaters' Society and is a member of the Electrochemical Society.

Mr. McNeil started his career of plating and polishing in the Underwood Elliott Fisher Plant in Bridgeport, leaving there to go to the Contract Plating Company in Stratford where he became plant superintendent. After 12 years at the Contract Plating Company, he worked at Bridgeport Thermostat as finishing supervisor.

Because of this excellent background, Mr. McNeil is well qualified to service the metal-cleaning compounds produced by MacDermid, as well as to engineer and install complete metal-finishing plants.

## "Scotchlite" General Manager

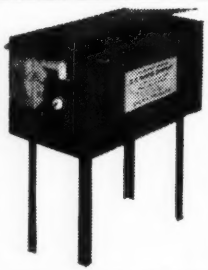
The Minnesota Mining and Manufacturing Co., St. Paul, Minn., announces the appointment of Bert S. Cross, new products manager for the past two years, as general manager of the "Scotchlite" Division where this reflective material is now being produced on a full-scale basis for war applications, including use on air field, harbor, and buoy markers, ammunition trucks for striping purposes, and so on.

## Cordiner Named G-E Vice President

Ralph J. Cordiner has been elected vice president and assistant to the president of the General Electric Company, with general administrative duties as designated by the president. Mr. Cordiner has been assistant to the president for the past 18 months since his resignation as vice chairman of the War Production Board.

## Jones-Dabney Officers

At a recent directors' meeting, the following officers of the Jones-Dabney Company, Division of Devoe & Raynolds Company, were elected: William C. Dabney, president; Andrew W. Bornhauser, vice president and general manager; James C. Wilcox, vice president and director of sales; Edwin J. Probeck, vice president; William S. Stark, vice president; Fred H. Volk, secretary; and Earl L. Pangborn, treasurer.

**HEAT WAX (AXS 1015)**

**For Export Packaging**

**CLEAN METALS *Faster! Cheaper! Safer!***

Cooper specially engineered electric or gas heated thermostat controlled tanks pay for themselves in a hurry. A multitude of uses. 5, 15, 30, 60 gallon sizes and larger. Quick delivery. Write for circular.

*Also Chemicals, Rust Preventatives, Silica Gel, Etc.*

**D. C. COOPER COMPANY, 20 East 18th Street, Chicago 16, Illinois**

**NON-INFLAMMABLE • WATER-SOLUBLE • FREE-RINSING**

Turco Stripper L-780 penetrates toughest paint on aluminum, magnesium, wood and steel rapidly, evaporates slowly, and makes possible the complete removal of large areas of paint by unskilled help. In line with Navy Specification C-113, it is non-inflammable, safe for aircraft and other assemblies combining reactive and non-reactive materials. Though powerfully fast-acting and rinsable with water, Turco L-780 has no tendency to warp wood. You'll find it excellent in every respect for practically all types of paint stripping. Write today for Bulletin A-72-P.

TURCO

**INDUSTRIAL CLEANING COMPOUNDS**

**TURCO PRODUCTS, INC. Main Office and Factory: 6135 S. Central Ave., Los Angeles 1, California • Chicago Office and Factory: 125 West 46th Street, Chicago 9 • Southern Factory: 1606 Henderson St., Houston 1, Texas • Offices and Warehouses in All Principal Cities.**

## Kidde Acquires Youngstown Miller Company

Walter Kidde & Company, Inc., Belleville, N. J., announces that it has purchased the capital stock of the Youngstown Miller Company, Inc., formerly of Sandusky, Ohio, manufacturer of plastic coaters and oil reclaimers. All operations will be transferred to 675 Main St., Belleville, N. J., where orders on hand will continue to be filled under the direction of F. L. Gerin, who becomes vice president and general manager.

Other officers of the new subsidiary of Walter Kidde & Company, Inc., include John F. Kidde, president; Harold A. Cartier, vice president; G. Crosby Hiss, secretary, and William Deyerberg, treasurer and comptroller. R. E. Strobel will continue as sales manager for the Youngstown Miller products.

## Luedke Returns to Eagle

J. Howard Houston, general manager of Eagle Printing Ink Co., Division of General Printing Ink Corp., New York, announces that Edward A. Luedke has resumed his duties as sales manager for Eagle.

Since May 1942 when Mr. Luedke returned to active service as a major, he has spent over 19 months overseas with the Allied Forces Headquarters in North Africa and Italy.


Now for EVERY WORK SHOP!

NEW Invention Electroplates by BRUSH

Easy to Plate CHROMIUM
GOLD, SILVER, NICKEL, COPPER
. . . For Pleasure and Profit!

If you have a workshop—at home or in business—you need this new Warner Electroplater. At the stroke of an electrified brush, you can electroplate models and projects—you can replate worn articles, faucets, tools, fixtures, silverware, etc with a durable, sparkling coat of metal . . . Gold, Silver, Chromium, Nickel, Copper or Cadmium. Method is easy, simple, quick. Everything furnished—equipment complete, ready for use. *By doing a bit of work for others, your machine can pay for itself within a week.* So make your shop complete by getting a Warner Electroplater right away. Send today for FREE SAMPLE and illustrated literature. ACT AT ONCE!

For
- MODEL MAKERS
- MAINTENANCE
- HOBBY SHOPS
- HOME SHOPS
- SALVAGE PARTS

WARNER ELECTRIC CO., DEPT.
360 North Michigan, Chicago 1, Illinois


## United Platers Staff Promotions

Promotion of several executives and additions to the staff of United Platers, Inc., Detroit, Mich., are announced by Glenn H. Friedt, president and general manager.

James J. Malone has been advanced to the post of assistant general manager. Edward W. Tawyea has been promoted from superintendent to general superintendent. Formerly assistant sales manager, George D. Blair has been made manager of the Sales Division. W. Meyer, previously office manager, has been promoted to comptroller.

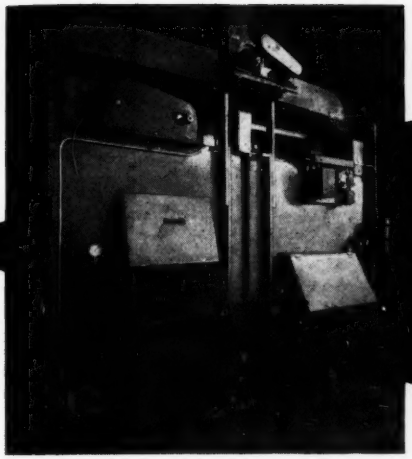
Clarence Norris, for 16 years connected with the U. S. Rubber Company, has been added to the technical staff of United Platers, Inc. In addition, Walter E. Kolemainen has been promoted to the position of assistant superintendent.

## Verd-A-Ray $5,000 Slogan Contest Winners

A jury consisting of three Toledo business men, all closely affiliated with advertising, has announced its final selections in the slogan contest sponsored by the Verd-A-Ray Corp., Toledo lamp manufacturer. In the unanimous opinion of the judges, the winning slogan was "A Good Buy to See By." The winning contestant was Frank Dresser, Philadelphia, Pa., who received a Series "E" War Bond of $1,000 maturity value.

Second prize, a $750 War Bond, was awarded to Martin L. Bettinger, Toledo, Ohio; a third prize, a $500 War Bond, to Mrs. Frederick Estano, Roxbury, Mass.; and fourth prize, a $250 War Bond, to Bernard Weiler, Philadelphia, Pa. Twenty-five prizes of $100 maturity value War Bonds, together with seven similar prizes for duplicate slogans, completed the list of awards.

The new slogan will be used in a national advertising campaign now being planned for Verd-A-Ray incandescent lamps.



# METAL WASHER MAINTENANCE *MADE EASY*

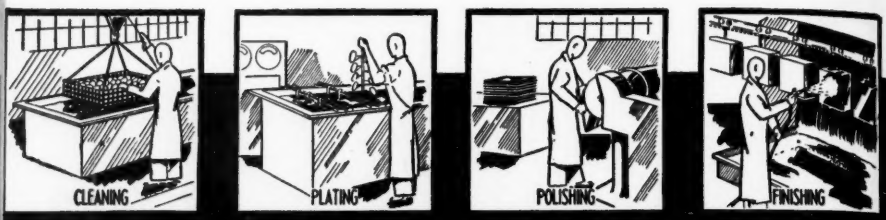
The improved design and construction of American Metal Washers answers the need for easier, lower-cost maintenance.

Double hinged, man-sized service doors permit entrance without removal of a great number of bolts—two simple locks, hand-operated, make access easy. All pipe unions in American Metal Washers are easily accessible, making nozzle removal possible without entering the machine. Large, hinged covers give access to the solution tanks. All grease nipples are located in a manner that encourages regular lubrication. The float valve on solution tanks maintains liquid at the proper level at all times, and requires no attention. The duplex strainer, under the solution return spout is so located and designed that ONE can be emptied while the OTHER remains in proper position to permit uninterrupted operation of the machine.

*Take the opportunity to contact our engineers. Their background of experience in dealing with metal washing problems and the design of metal washing machines is available in finding the easy, efficient solution to your metal washing problems.*

**American**
**FOUNDRY EQUIPMENT CO.**

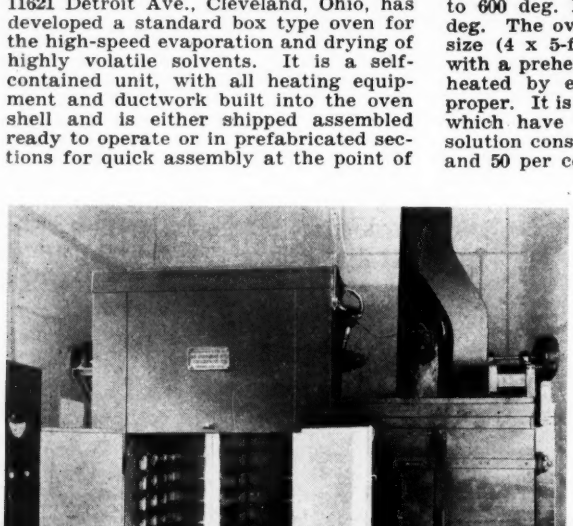
525 SOUTH BYRKIT STREET • MISHAWAKA, INDIANA




# New Equipment and Materials

## Industrial Box Type Oven

The Industrial Oven Engineering Co., 11621 Detroit Ave., Cleveland, Ohio, has developed a standard box type oven for the high-speed evaporation and drying of highly volatile solvents. It is a self-contained unit, with all heating equipment and ductwork built into the oven shell and is either shipped assembled ready to operate or in prefabricated sections for quick assembly at the point of operation. Door sizes range from 3 feet wide x 3 feet high to 5 feet wide x 6 feet high, and working depths from 3 to 6 feet. The temperature range is from 150 to 600 deg. F., with a tolerance of ±2 deg. The oven illustrated is a standard size (4 x 5-foot door and 4-foot depth) with a preheating zone added, the latter heated by exhaust air from the oven proper. It is used to dry fabricated parts which have been dipped in a finishing solution consisting of 50 per cent alcohol and 50 per cent solid matter.

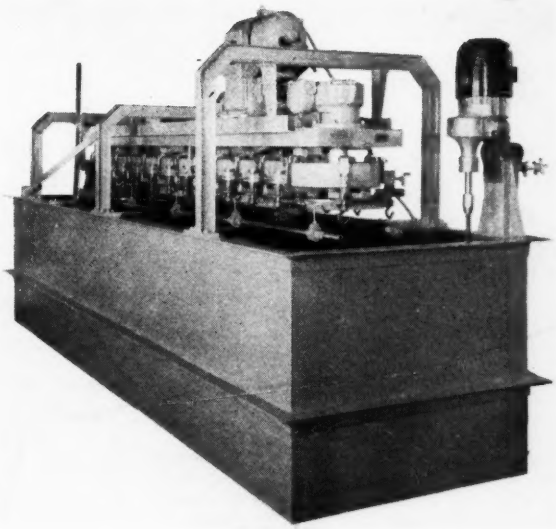


The Industrial Box Type Oven can be used not only for alcohol but for acetone, naphthas, methyl-ethyl-ketone, and many other highly volatile solvents, and can also be readily converted for other types of drying, finishing, heat-treating, or heat processing operations where materials can be handled in trays, jigs, or baskets. It is especially suited to dense loads where air stream resistance is high. Completely automatic controls of the expansion recording thermometer or milli-voltmeter type, either air or electrically operated, can be supplied.

●

Industrial Box Type Oven

Lasalco High Speed Plating Machine



## Lasalco High Speed Plating Machine

A reciprocating type semi-automatic high speed plating machine with rotating cathode has been developed by Lasalco Inc., 2818 LaSalle St., St. Louis 10, Mo. Designed to maintain an even quality of solution at the cathode, the machine is constructed to prevent the corrosion of operating parts and is adaptable for plating inside surfaces of bearings and other similar parts, large and small.

A single drive maintains both reciprocating action and chain travel, with the chain and mechanism submerged in oil to prevent corrosion. This latter mechanism is almost entirely enclosed. The plating tank can be provided with an agitator boot for either a single type of solution agitation or a combination of several motions. The machine can be furnished in any size to suit specific requirements or conditions.

## "Swirt" Water Soluble Metal Cleaner

The Phillips Chemical Co., W. Touhy Ave., Chicago 45, Ill., announces the addition of a water soluble metal cleaner known as "Swirt" to its line of controlled cleaning chemicals. Described as a powerful emulsifying cleaner that is entirely harmless to the worker and the work, Swirt is said to act efficiently upon all types of grease, buffing compounds, cutting and machining coolants and oils, and to be equally effective on ferrous and non-ferrous metals.

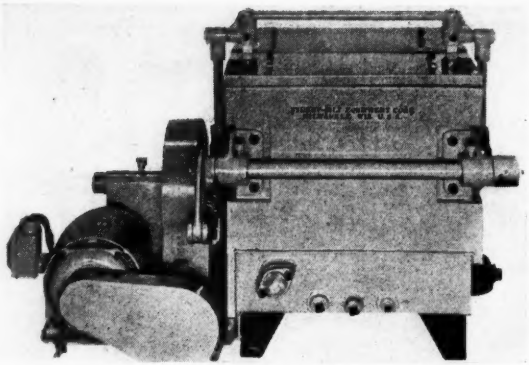
According to the manufacturer, Swirt gives off no dangerous or disagreeable vapors to injure or annoy the operator. Being neither acid nor alkaline, it will not etch or pit and can be safely used on the most sensitive metals and alloys, it is claimed. Fire hazards are said to be reduced because of the cleaner's high flash point (155 deg. open cup).

Swirt may be used in practically any type of container from a bucket to a thermostatically controlled heating tank or degreaser. To clean a metal part, the part is merely rinsed in Swirt and flushed with plain water. Swirt is claimed to be economical to use since it does not dissipate readily by evaporation and stays clean long due to the fact that most of the soil and grease is carried off in the rinse water.

In automatic washing machines, Swirt is said to be effective in very weak dilutions. For equipment maintenance, it may be used as a spray. Swirt may be blown dry with air or hand wiped.

## Sturdy-Bilt Model "B" Simplex Metal Parts Cleaner

Said to incorporate the "active soak" and "swishing action" features of other Simplex Cleaners, the Sturdy-Bilt Model "B" Simplex Metal Parts Cleaner illustrated herewith is announced by the Sturdy-Bilt Equipment Corp., Depart-



Sturdy-Bilt Model "B" Simplex Metal Parts Cleaner

•

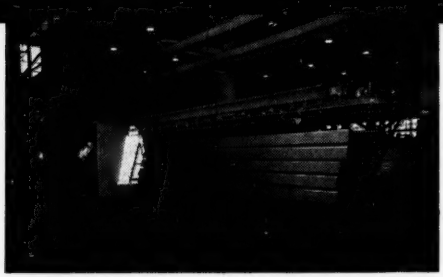
ment P12, West Allis 14, Wis. To use, the operator simply loads the tray of the unit with the objects to be cleaned, throws the switch, and the unique action of the Simplex is said to provide for the washing away of all oil, chips, dirt, and so on, clinging to the parts being cleaned. Hot or cold solution may be used.

Of extra heavy construction, the Model B Simplex is specially designed for installations where extremely severe working conditions are encountered. In addition, the unit incorporates a unique method of scum and oil removal. A slide tank receives the floating oil and scum by the introduction of more soaking solution into the bottom of the main tank. When the oil removal tank becomes full, it can be drained and the oil filtered for further use.

Applications for the Sturdy-Bilt Model B Simplex Cleaner include the washing, slushing, cleaning, rinsing, and dipping of metal parts, housings, crankcases, small assemblies, tools, and small gears. Units may be installed singly in different departments or in series for special requirements.


Easy to solve drying problems when you use "JENSEN Know-How"

**Stumped** by an "impossible" drying problem? Call in Jensen, like International-Stacey Corporation, of Columbus, did. For this top-flight concern, Jensen designed and built a special "Dual-heat" infra-red oven and conveyor system that actually dries black pitchblende paint on 20' long, ¼" thick channel irons in 8 *minutes!* ★ Jensen ingenuity can help you, too. Phone or write about *your* problem *today!*



**SPEED.** *Drying bitumastic paint, having a coal tar base, on these huge channel irons formerly took 24 hours. Jensen "Dual-heat" does the job in 8 minutes!*

JENSEN SPECIALTIES, Inc. JENSEN 9331 FREELAND DETROIT 27, MICH.

DESIGNERS and BUILDERS of "DUAL HEAT" INFRA-RED OVENS • STANDARD and SPECIAL CONVEYORS

# Balk Corrosion on Zinc or Cadmium the Fast, Sure, Iridite Way

***Test this free panel. See for yourself how Iridite battles corrosion . . and wins.***

You apply Iridite by simply dipping in 15 to 60 seconds. It dries in a few seconds, can be immediately handled and shipped. No special personnel or equipment needed.

Making—or planning to make—zinc or cadmium plated products? Then mail coupon below for test panel of Iridite-protected zinc—and see for yourself what economical, quickly-applied Iridite can do for you.

Use Iridite as a paint base and your products hold their paint permanently. Use it as final finish and its attractive colors bring you more sales.

Many big-name manufacturers already specify Iridite for their products. They began as you will—by corrosion-testing this panel in their own labs. Coupon attached for your convenience.

RHEEM RESEARCH PRODUCTS, INC.
IRIDITE
2523 Pennsylvania Ave., Baltimore, 17, Md.

Rheem Research Products, Inc.,
804 Chemical Bldg.,
2523 Pennsylvania Ave.,
Baltimore 17, Md.

Gentlemen: Please send me a free test panel of Iridite-treated zinc plate. Also full information and operating details.

Name.....

Company.....

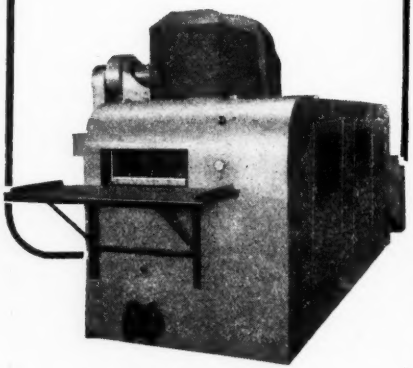
Address.....

.....

*Absolutely*
**CLEAN-DRY METAL PARTS**
*with*
**"STURDY-BILT"**
***SOAKER-TYPE***
**METAL CLEANING EQUIPMENT**
Removes OILS, GREASE, CHIPS, ETC.
(MASS PRODUCTION)
*Write for details*
**Sturdy-Bilt Equipment Corp.**
**Dept. P4 West Allis 14, Wisconsin**

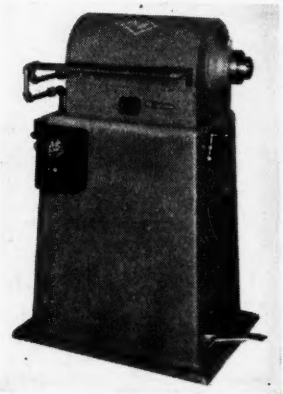
• SIMPLE • COMPACT MECHANISM

• A time-proven idea developed into Modern Equipment.



## Schauer Air-Operated Variable-Speed Speed Lathe

Single foot-pedal control of the entire work cycle is an outstanding feature of a heavy duty air-operated variable-speed speed lathe now being offered by the Schauer Machine Co., 2060 Reading Rd., Cincinnati 2, Ohio. Another feature includes the application of air operation to the work spindle, which has a 1-inch clear hole through it for handling rod or bar stock or long workpieces.



Schauer Air-Operated Variable-Speed Speed Lathe

The Schauer Air-Operated Variable-Speed Speed Lathe is designed to accommodate collets up to 1⅝ inches maximum capacity. Step chucks, expanding mandrels, or special work-holding fixtures can also be used on the unit. The motor operates continuously. Pressure on the foot pedal closes the collet, releases the brake and connects the motor to the work spindle through a Twin Disc clutch assembly. The air line is equipped with a control valve which provides for a time-lag before the collet releases the work.

Variations in spindle speeds are obtained through the use of a Reeves drive, with the control handle located convenient to the operator. Spindle speeds from a minimum of 100 r.p.m. to a maximum of 4,899 r.p.m. (in a ratio of 6 to 1 or 12 to 1) can be selected. The machine is designed for use in performing such secondary finishing operations as polishing and deburring metal and plastic parts.

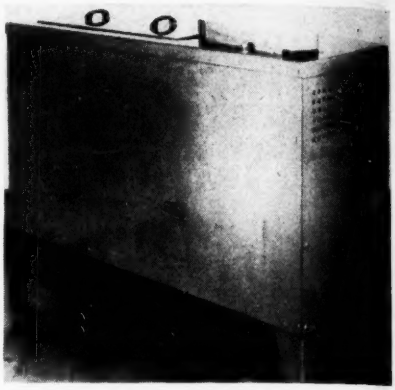
Whatever you expect of postwar industrial synthetic coatings, expect it of Pratt & Lambert-Inc.

PRATT & LAMBERT-INC.
*Industrial Finishes*
NEW YORK BUFFALO CHICAGO
FORT ERIE, ONT.

## Youngstown Miller Models 3-8 and 5-8 Plastic Coaters

The Youngstown Miller Co., Sandusky, Ohio, announces the addition of two small plastic coaters, designated as the Models 3-8 and 5-8, to its line of equipment for melting and maintaining ethyl cellulose and other plastic protective coatings in which parts and tools are to be dipped.

Each unit has a plastic pump arrangement which provides for a constant level in the dip tank and continual removal of surface film and bubbles caused in dipping. In addition, oil jackets the sides and bottom of each tank. Oil and plastic are thermostatically controlled so that the electric heaters are shut off when either reaches its ceiling temperature.



Youngstown Miller Model 3-8 Plastic Coater

The Model 3-8 plastic coater illustrated herewith has a capacity for melting from 3 to 5 lb. of plastic per hour and is provided with a dip compartment 6 inches wide x 9 inches long x 6 inches deep. The Model 5-8 is designed to melt from 5 to 7 lb. of plastic per hour and has a dip compartment 9 inches wide x 12 inches long x 6 inches deep. Both models can also be obtained with dip tanks having a depth of 13 inches.

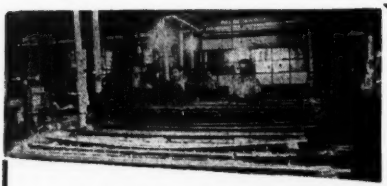

*FULL PROTECTION — LIGHT WEIGHT*
*LONG WEAR*
**NU-LITE PLASTIC** SLEEVES, GLOVES WORK APRONS

Provide full protection to workers from troublesome dermatitis induced by industrial irritants. Only 1/7th the weight of conventional protection garments — makes for wearer's comfort and freedom of movement—reducing fatigue.
NU-LITE sheds and resists water, oil, gasoline, strong acids, alkalis, degreasing and plating solutions.
Let us show you how NU-LITE's low cost protection features can boost production in your shop. Samples furnished for approval.

***Safety Equipment, Production Aids and Packaging Specialties***
**NULITE PLASTICS**
DEPT. PF VERONA, N. J.


## Polaroid Fog-Free Goggle

A goggle which, it is claimed, cannot cloud, up or fog regardless of how

**PERMAG Compounds meet the Cleaning Requirements of this Finishing Department**

Surfaces of all metal parts for plating or other types of finishes must be chemically clean. But how can this be done *quickly, efficiently, economically?* PERMAG COMPOUNDS were tried, and more than met the requirements — so PERMAG Compounds are aiding toward faster production in large and small plants engaged in war production.

*Let us send you details about this modern way of metal cleaning prior to finishing.*

**MAGNUSON PRODUCTS CORP.**
**50 Court St. Brooklyn 2, N. Y.**
**In Canada: Canadian PERMAG Products Ltd., Montreal, Toronto.**

# STOP!

**We can give you the green light to better plating by proving to you that**

## McKeon's

- "Liquid Sulphur" *is* **The Copper Strip of Today.**
- **"BLACK'NBRASS"** *produces* **Sulphide Blacks** on Brass.
- **"ZINC BRITE"** *removes* **Heavy Metal Impurities** from Zinc Plating Solutions.
- **"TIN STRIP"** *strips* Tin **without Damage to Base Metals.**

*Order a trial gallon of either one or all.*
*Sent you on 30 days approval.*

SERVICE and COOPERATION await you.

**SULPHUR PRODUCTS CO., Greensburg, Pa.**

Polaroid Fog-Free Goggle

much the wearer perspires, has been placed on the market by the Welsh Manufacturing Co., Providence, R. I. The Polaroid Fog-Free Goggle as it is known is fitted with a bulbous nosepiece and is powered by ordinary lung action. Normal breathing provides a sweep of fresh air in front of the wearer's eyes approximately once every second. This action removes moisture from within the goggle before there is enough of it to condense as fog on the plastic goggle lens, thus providing unblocked vision as well as eye protection against dust and other flying particles.

The Polaroid Fog-Free Goggle employs flow channels built into the goggle frame to guide air circulation efficiently. Inhalation draws air through the intake ports of the goggle. The air sweeps across the inside of the lens and passes through an inlet valve into the nose. Exhalation closes the inlet valve and opens the outlet valve in the base of the protruding nosepiece.

## Turner Transport with Four-Way Floor Plate Deck

According to an announcement made by the Factory Service Co., 4615 N. 21st St., Milwaukee 9, Wis., the application of a four-way floor plate deck to the standard Turner Transport chassis increases considerably the number of uses


NEW Improved PAINT STRIPPER and Cleaner!

**QUICKLY REMOVES PAINT, HEAVY GREASE WITHOUT HARMING UNDERLYING SURFACE**

Phillips P-304 is a powerful alkali cleaner. It will remove the thickest and most stubborn grease and dirt deposits. Especially effective for paint stripping on ferrous metals, when used in hot solution. Leaves surface chemically clean for finishing. Economical and efficient.

**SEND FOR CATALOG OF CONTROLLED CLEANING COMPOUNDS AND SOLVENTS FOR *EVERY* NEED**

Write today for prices and full details on Phillips P-304 Paint Stripper — also for information on Phillips specialized cleaners developed for every type of cleaning job—degreasing, rust removing, spray booth and floor masking, descaling, dish-washing, bottle washing, electro cleaning, interior cleaning, glass cleaning, brass cleaning — and mechanics hand soaps and liquid soaps.

***(Distributors: Exclusive territories still open)***

**PHILLIPS CHEMICAL CO.**
**3481 W. TOUHY AVE., CHICAGO 45**

# Keep Spindles like New
# Keep Polishing Wheels True
# Avoid Risk to Operators
# Do a Better Job, Too!

Just press them in on your own spindle.

The notches hold the bushing in — the wheel *stays concentric regardless of how often changed.*

***What's more,***

**Presto Polishing Wheel Bushings help keep wheels concentric with uniform contact all around. Avoid *wasteful time-consuming truing up*—assure even wear—do a *better job QUICKER* with no waste of grain.**

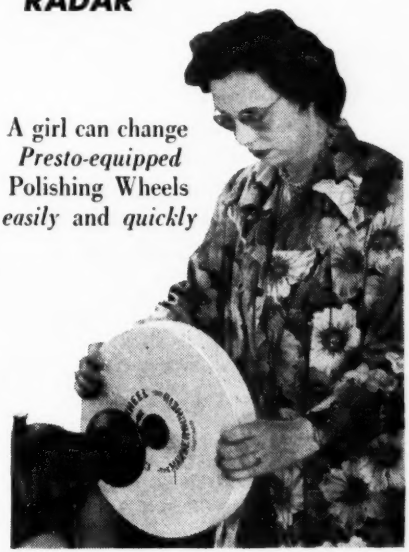
**No wonder outstanding plants all over America are using thousands of Presto Bushings. Never before has the Polishing Industry had so much benefit at such low cost.**

**Write for *FREE Samples* and see the many advantages. Just specify size of spindle on which the wheel will be used.**

**Jobbers in principal cities.**

**Specify "*Equipped with Presto Bushing*" when you order Polishing Wheels**

***Modern as***
**RADAR**



A girl can change *Presto-equipped* Polishing Wheels *easily* and *quickly*

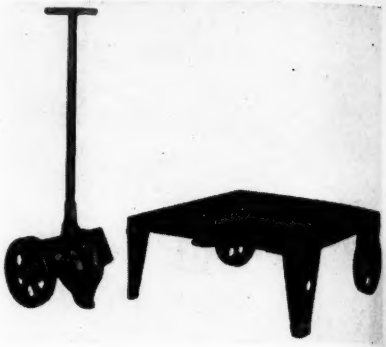
*The* **MANDERSCHEID** *Co.*

605 West Washington St., Chicago 6, Illinois

**Serving the Metal Finishing Trade over 35 Years.**

for this materials handling unit. The floor plate deck is welded flush with the top of the chassis on the angles of the frame and is reinforced on the underside by two heavy angles. The non-skid feature of the deck prevents metal parts from "walking off" easily when the transport is in motion. In addition, the embossments provide point contact with hot materials, thus allowing some air space between them and the steel deck and thereby eliminating warping of the deck.

The Turner Transport can be maneuvered in restricted areas by means of a hand jimmy, power lift truck, crane, tractor, or conveyor. With Turner piling stakes, the load may be expanded vertically to any practical height. In addition, steel or wooden bin sections or section trays may be interlocked one on another on top of the transport, thus making available bins as high or low as the particular job requires.



Turner Transport with Four-Way Floor Plate Deck


**PLATING EQUIPMENT WANTED**

**ELECTROPLATING:**

—GENERATORS
—RECTIFIERS
—RHEOSTATS
—BARRELS
—ETC.

We will buy or sell any electroplating or polishing:

**EQUIPMENT • CHEMICALS • COMPOUNDS**

State Full Particulars

*Write Dept. PF*

**INDUSTRIAL PLATING COMPANY**

772-6 COMMUNIPAW AVENUE
JERSEY CITY 4, N. J.


## B & C "Hundred" Series Face Shield

Designed to provide maximum comfort to the wearer, a face shield featuring complete interchangeability of parts, to be known as the "Hundred" Series, is announced by the Boyer-Campbell Co., 6540 St. Antoine St., Detroit 2, Mich. The face shield is available in four models designated as the 100, 200, 300, and 400, each model being identified by a variance in the design of the head gear. For each model of face shield a choice is also offered of three different thicknesses and three different sizes of cellulose acetate general purpose windows, three different sizes of 24-mesh screen windows for heat protection, and a fiber front for scarfing and welding.

The back head band of the B & C Hundred Series Face Shield is designed for low wearing on the head and is completely adjustable for snug fitting to any size of head in either the elastic head band (Models 100 and 200) or the


*For a real good polishing job use*

**KEYSTONE EMERY**

TURKISH — NAXOS — AMERICAN

KEYSTONE EMERY MILLS *Write for Sample* 4316 Paul St., Phila., Pa.

PLASTO-PAK is a COLD DIP* Strip Coating designed to prevent corrosion, tarnishing, or scratching of metals during production, assembly, shipping or storage.

* Plasto-Pak can also be sprayed.

**Approved for Method IB Packaging by U. S. Army Signal Corps.**

*Write for Technical Bulletin P for full information.*

# STANDARD VARNISH WORKS

***Engineers of Product Finishes***

**2600 RICHMOND TERRACE**
**STATEN ISLAND, N. Y.**

**2600 FEDERAL STREET**
**CHICAGO, ILLINOIS**

B & C "Hundred' Series Face Shield

all-fiber head band (Models 300 and 400) types. In this manner, the weight of the shield is evenly distributed over the entire head gear with the result that there is no sense of burden or unbalance no matter how long the shield may be worn, the manufacturer states.

## Manganesed-Phospholene No. 7

An easily applied and ready to use product that is said to dissolve rust and combine chemically with metal surfaces to form a rust-inhibiting coating, thus resisting futher rusting and corrosion, is now being manufactured by the Western Reserve Laboratories, 1440 W. Third St., Cleveland 13, Ohio. Designated as Manganesed-Phospholene No. 7, the material can be brushed or sprayed on machinery, instruments, tools, hoists, and other equipment where rust accumulates through the presence of dampness, moisture, or humidity.

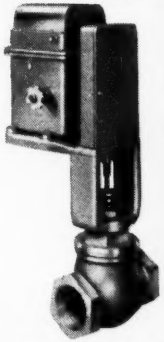
The metal to which the material is to be applied should be free from oil, grease, or other foreign matter. One application is said to be sufficient if the rust is not heavy, and several applications are required for heavy rust, depending on the type and condition of metal being treated. Paint, lacquer, enamel, plating, and other protective coatings are said to adnere firmly to Manganesed-Phospholene treated metal and, it is claimed, will not peel. The treated metal consists of rust-resisting crystals that become a part of


**BARBER-COLMAN**

**MICRO SYSTEM *for* FINISHING CONTROL**

REMOTE BULB MICROTHERM

Plating tanks, anodizing baths, and many other finishing operations where uniform temperature must be maintained, can be improved by using the Barber-Colman automatic electrically-operated "MICRO System" of temperature control equipment. Features include simple construction, no relays, and maximum power at all points of the valve stroke: "Hunting" is eliminated and the valve is positioned quickly with "micrometer accuracy."



PROPORTIONING VALVE

*Write for Bulletin*
"CONTROLS FOR INDUSTRY"

**BARBER-COLMAN COMPANY**
1248 ROCK ST. • ROCKFORD, ILL.

# HORN

*suggests—*

# KERATYN

***NEW · LOW BAKE · QUICK BAKE***

**PORCELAIN LIKE FINISH**
**NO DISCOLORATION**
**CLEAR AND IN ANY COLOR**
**ANY DEGREE OF GLOSS**

**A. C. HORN COMPANY**
PRODUCTS FINISHING DIVISION
LONG ISLAND CITY 1, NEW YORK
CHICAGO • HOUSTON • LOS ANGELES

the metal. These crystals are absorptive to paint (or oil), thus affording the paint a firm grip.

Non-inflammable and odorless, Manganesed-Phospholene No. 7 is available in containers having shipping weights of 14 lb. per gallon of material.

## Jensen "Nesting" Method for Infra-Red Lamps

A "nest of heat" method of spacing R-40 reflector lamps in infra-red ovens that is said to assure both full and even coverage of the article being baked is announced by Jensen Specialties, Inc., 9331 Freeland Ave., Detroit 27, Mich. With this method, the lamps are staggered so as to provide for overall distribution of infra-red rays.

Particularly significant in connection with the baking of white paint and pastels, the Jensen "Nesting" Method is said to prevent possible discoloration of the part by eliminating the danger of overbaking certain areas while underbaking others. Nesting is achieved by advancing the lamps in each row a quarter step or more beyond the lamps in the preceding row, according to the requirements of the job. Blank spaces are thus eliminated and full, even coverage assured, it is stated. In addition to the intensive concentration of infra-red rays attained by nesting, maximum heat densities are likewise obtained, with a resultant saving in the time required for the baking cycle.

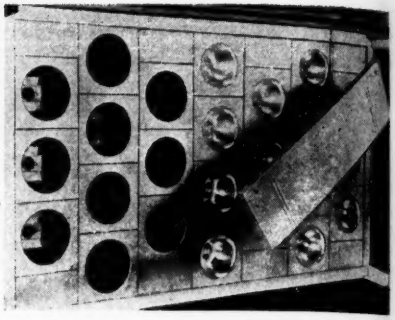


Illustration showing the manner in which reflector lamps are spaced in infra-red ovens using the Jensen "Nesting" Method

REMOVE PAINT
CLEAN METAL with FIDELITY
Stripping and Cleaning Compounds
No matter what the surface looks like, the right Fidelity product will restore it to clean metal in record time!
Coats of paint and enamel break loose easily with the proper stripper. Grease and grime quickly dissolve with the correct cleaner. The result is a perfectly clean surface, ready for any type of finishing.
Call in a Fidelity service engineer today for a free survey of your cleaning requirements. His recommendations will help to step up efficiency in your plant.
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"Serving industry with cleaning and stripping compounds"
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HUmbolt 3-3640

# STOP! STOP-OFF TROUBLES

## COSTS LESS TO USE SAVES TIME

BUNATOL No. 608 Stop-Off (at a new low price) is the last word in a high grade Stop-Off for use in any strong alkaline plating solution such as Copper or Tin; it really holds on the trimmed edge.

No. 608 is a quick air drying heavy bodied liquid applied by dipping or brushing. It combines remarkable chemical resistance with adhesive qualities so superior that edges can be trimmed to a hair-line; and hold without the plate creeping. It will not tree or plate through; will not etch polished surfaces; will lay over irregular surfaces without bridging.

For selective hard Chrome plating where defined areas must be protected from the deposited metal use the dependable BUNATOL No. 474 Red Stop-Off. For those extreme service conditions No. 608 is indicated for hard Chrome as well as in alkali.

Let BUNATOL 608 or 474 Stop-Off stop your stop-off troubles. Write for complete information or order a trial gallon at once.

**NELSON J. QUINN COMPANY**

**TOLEDO 7, OHIO**

# BUNATOL 608

## Fostoria Portable Infra-Red Unit

A portable infra-red unit which may be clamped or set up on or over benches, tables, conveyors, machines, and so on, has been placed on the market by The Fostoria Pressed Steel Corp., Fostoria, Ohio. The unit is available in three models designated as the 60-000, 60-200, and 60-100.

The 60-000 is strictly a hand model which can be converted to a self-supporting model by the addition of flexible arms and a base. The Model 60-200 includes a clamp base which permits it to be mounted on benches or framework, either singly or in multiple pairs. The flexible arms allow for positioning the unit at any angle desired. The Model 60-200 is 40⅞ inches long from bench top to reflector edge and is designed for clamping on pipes of round or square stock up to 2 inches and/or benches up to 2⅛ inches thick.

The 60-100 is a flexible model which can be moved quickly and easily. A crow-foot base with vertical upright and adjustable clamp permits the horizontal arm of the unit to be moved up or down to a maximum height of 24 inches and to be extended horizontally a maximum of 19 inches. The crow-foot base is provided with rubber feet.

Fostoria Model 60-100 Infra-Red Unit

The Fostoria Portable Infra-Red Unit features a reflector that is gold plated on the inside. The outside of the unit is finished in gray wrinkle. Each model is supplied complete with 18 feet of cord with plug and switch, as well as 375 watt 110-volt G-30 lamp with medium skirted mechanical base. All models can be operated on either alternating or direct current.


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*Available Again!*

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**BALLOU'S**

**Imitation Chrome Aluminum Paste**

Will produce a beautiful imitation of a real plated finish when used in conjunction with quick bake synthetic or varnish type vehicles.

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***Send for sample and prices.***

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**6 Varick Street, New York 13, N. Y.**



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***"Vienna Brand" Lime***

Made from Limestone that is identical in chemical analysis and geological structure with European Imported Lime. Tests show a "lime cake" made from Allwood "Vienna Brand" Lime equals the finish made from imported lime.

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**ALLWOOD LIME COMPANY**

**Manitowoc • Wisconsin**

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IS A CHEMICAL DIP TREATMENT FOR IRON, STEEL, ZINC AND CADMIUM PROVIDING A RUST INHIBITING BASE FOR PAINT . . . OR A FINAL FINISH

Rust will not be a problem if the IRCO-IZING process is used to insure the maximum protection. Thus you have fewer rejects due to paint failures. When the IRCO-IZING PROCESS is used on metal the finish will last 3 or 4 times longer.

The IRCO-IZING PROCESS is easy to install — many times we have been able to use the equipment you already have on hand. Write to us about your problems and you can be assured that our engineers will be happy to make tests for you without any obligations.

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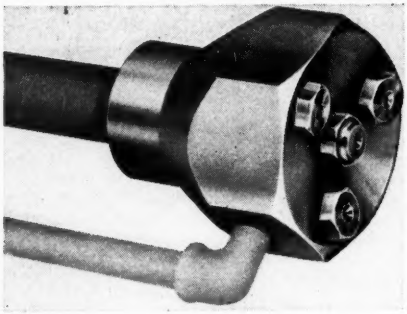
## Spraying Systems External Mixing Nozzle

Various types of liquid proportioning and mixing jobs can be readily handled by means of an external mixing nozzle



Spraying Systems External Mixing Nozzle

developed by the Spraying Systems Co., 4015-21 W. Lake St., Chicago 24, Ill. The nozzle is actually a four-nozzle assembly with one nozzle mounted in the center of the mixing head and three nozzles located on 120-deg. centers near the outer edge. A side line is used to feed the center nozzle, while the other three nozzles are supplied from the main line. The outer nozzles are located on the concave face of the mixing head at an angle calculated to provide for thorough mixing of the four streams. The Spraying Systems External Mixing Nozzle utilizes "Fulljet" nozzles, each nozzle producing a full cone pattern spray of uniform distribution. Accurate machining and precision construction enable each of the component nozzles to deliver specified volumes under given pressure conditions. Nozzle combinations may be varied to obtain any desired proportion between the two liquids being mixed. Atomization of the liquids may be coarse or fine.

The Spraying Systems External Mixing Nozzle is available in brass, stainless steel, and other materials.

## Phillips Two-Stage Surge Washer

The two-stage surge washer added to the line of metal cleaning machinery pro-


JUST FOR THE RECORD

CEL-U-LAK

A complete line of cellulose derivative lacquers and enamels.

FORM-A-ROC

A unique line of quick-baking, tough adhesive synthetic enamels.

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After V-day they will mean something to you.

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For Present Day and Post War Problems, Investigate

To cut down your cost, increase production and improve your product, investigate the LUPOMATIC patented process for producing metal parts to a high lustre.

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# NEWEST FEATURES
## Obtainable For Plating

### 6 VOLTS, 2000 AMPERES OR 12 VOLTS, 1000 AMPERES

Operator's Panel | Accessories | Control | Rectifier

**For nickel, zinc, chrome and cadmium still plating—barrel plating—cleaning, etc.**

Here is a power supply unit consisting of a G-E "2000" copper-oxide rectifier, a G-E motor operated control and two control panels. Entirely automatic in operation, it will maintain tank voltage at any selected point within its rating (3 to 6 volts—max. 2000 amperes, or 6 to 12 volts—max. 1000 amperes). This unit power supply offers all of the latest advantages for modern plating.

**HERE ARE A FEW ADVANTAGES**

1. Low initial cost—Long life.
2. High operating efficiency —Low power bills.
3. Push button controls to provide smooth, "ON-LOAD" uninterrupted adjustment of d-c power to the plating tank over the equipment's entire output voltage range.
4. Constant output voltage within ± 1% automatically maintained.

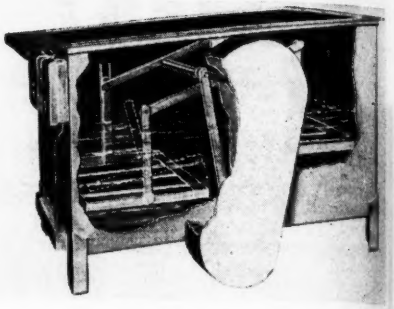
For plating or anodizing there are many differently rated G-E rectifiers and rectifier controls from which to choose. Check your plating room requirements then double check them with G-E engineers. Make sure the equipment you use is best for your needs. For details write to Section A454-70, Appliance and Merchandise Department, General Electric Co., Bridgeport, Connecticut.

BUY WAR BONDS AND KEEP THEM

GENERAL ELECTRIC

duced by the Phillips Manufacturing Co., S3427 W. Touhy Ave., Chicago 45, Ill., is designed to provide an economical means for washing smaller type parts in baskets, using an emulsion cleaner (or alkali cleaner) and water rinse. In construction, the unit comprises two compartments with a dividing insulated wall. One compartment contains the cleaner and the other the water rinse.

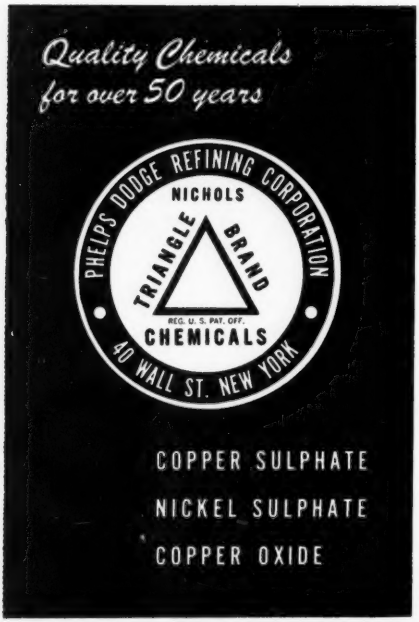
The operating mechanism of the Phillips Two-Stage Surge Washer is reciprocating in action, moving the rack on which the basket rests up and down through the cleaner and rinse, and accommodates two baskets at one time—one being swished through the cleaner while the other is being swished through the rinse. With this reciprocating cycle, the baskets are moved vertically through the solutions, from total immersion to total emersion, with a maximum of agitation produced for the removal of chips, soil, and so on. Either surge platform is said to accommodate basket loads of 50 lb., operated singly or together.



Cutaway View of Phillips Two-Stage Surge Washer

The Phillips Two-Stage Surge Washer is 40 inches long x 21 inches wide. Each tank is designed to hold 16½ gallons of solvent or water, and each surge platform accommodates baskets 14 inches square x 6 inches high. The reciprocating mechanism is powered by a ⅓ h. p. motor. The machine is offered in four models; namely, unheated, with heated solvent tank, with heated rinse tank, and with both tanks heated. Heated tanks are provided with automatic thermostatic controls which are said to maintain the temperature of the solution to within plus or minus 5 deg. F. The water rinse tank provides for overflow and can be equipped with a flow control valve. Thus, the water rinse tank can be heated by utilizing a supply of hot water where present or can be electrically heated where hot water is not readily available.

The Phillips Two-Stage Surge Washer is recommended for use with "Swirt" emulsifying metal cleaning compound, however, it can also be used with any other cleaning compound that does not adversely affect galvanizing steel. The machine is provided with a hinged cover which can be locked into position as a drain board for draining the solvent back into the tank before baskets are placed in the rinsing compartment.

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## IN MASKING PARTS FOR SELECTIVE PLATING

*Michigan Chrome*

## PROVIDES THE EXACT MATERIALS TO MEET YOUR NEEDS

AVAILABLE in lacquer form are Miccro-Supreme Stop-Off Lacquers in two colors (red and black) and Miccrome in three colors (red, blue and green) Recommended for specific applications, these materials offer unexcelled protective qualities, excellent adhesion and good dielectric strength. Each can be quickly and easily applied or removed.

Miccrotape—the first extruded masking tape—fits snugly in grooves and around shoulders, making it particularly useful in hard chrome plating. It is easily applied and no time-consuming heat sealing is necessary before it is used. After plating, Miccrotape can be quickly removed, leaving a perfectly clean, unmarred surface.

One or more of these materials will meet your requirements *exactly*. Let us send you full details.

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*It's cheaper in the long run*

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**USA BRAND has proved it for over 20 years**

We manufacture Bobs to Blue Print and shape large wheels to sketch.

We also manufacture Sheet Felt in all hardnesses, both in square sheets or strips.

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**EASTERN FELT COMPANY**

*Manufacturers*

**80 CANAL ST., WINCHESTER, MASS.**

## "Steel Grip" Safeguard No. 15359

To meet the need for a protective glove for operators of strapping machines used in the preparation of materials for overseas shipment, the Industrial Gloves Co., 746 Garfield Blvd., Danville, Ill., has developed the "Steel Grip" Safeguard No. 15359 illustrated herewith.

"Steel Grip" Safeguard No. 15359

The glove is made of a flexible, comfortable, seamless palm pattern with extra palm patch of chrome tanned cowhide. The base glove is grain leather, thus assuring a comfortable fit. The fingers and thumb are open at the ends to further increase flexibility and permit the easy picking up of tape, wire, small tools, and so on. In addition, the open back design of the glove provides for coolness.

The Steel Grip Safeguard No. 15359 is made in sizes for men and women.

---

## Koroseal Tape MX

A tape for masking purposes in the plating industry, to be known as Koroseal Tape MX, is announced by The B. F. Goodrich Co., Akron, Ohio. According to the manufacturer, the tape possesses unusual resistance to wear and abrasion, has excellent insulating properties, and can be used for practically

## WITH A NEW, MODERN FINISHING SYSTEM *Planned and Installed Complete—by Despatch Engineers*

When refrigerators, washing machines and other new products start to roll, you'll need the *best* finishing system you can get—modern, efficient, and expertly coordinated from A to Z.

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Experienced Despatch engineers will plan, select and install in your finishing department such items as: OVENS • BONDERIZERS DRYERS • CONVEYORS WASHERS • AIR CONDITIONERS • SPRAY BOOTHS FANS and other necessary equipment.

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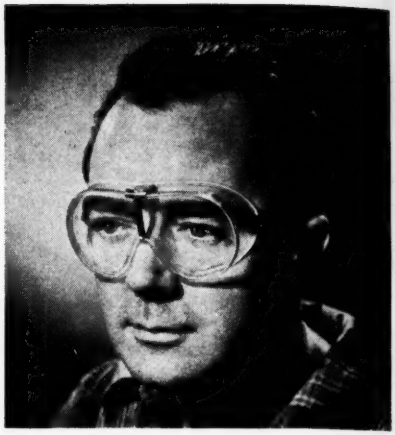
**DESPATCH OVEN COMPANY** MINNEAPOLIS 14 MINNESOTA

all kinds of plating solutions, including chromic, alkali, and acid dips. Any item which can be covered with regular friction tape can, it is claimed, be masked by Koroseal Tape MX.

To distinguish it from Koroseal Tape RX, which is made in glossy black, the new Koroseal Tape MX is gray in color. It is available in a ¾-inch width, approximately 500 feet in a roll; 2-inch width, approximately 375 feet in a roll; 6-inch width, approximately 312 feet in a roll; and 36-inch width, approximately 97 feet in a roll. The MX tape thickness is 0.005 inch while RX is 0.014 inch thick.

## Watchemoket "Eye Savers" Goggle

An all-plastic goggle which is designed to fit directly over prescription glasses and includes a full frame which provides added protection against injury from sides, top, and bottom, to be known as the "Eye Savers," is now being marketed by the Watchemoket Optical Co., Providence, R. I. According to the manufacturer, the lens material is crystal clear, nondistorting, and will not shatter or splinter under impact. Lenses can be easily removed for cleaning or replacement.



Watchemoket "Eye Savers" Goggle

The frame of the goggle is strongly reinforced with a metal clip at the

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Gold Plating Solutions

*Are Nationally Endorsed*

MADE BY A. Robinson & Son
131 CANAL ST. NEW YORK

W. C. Hammond
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OF KALAMAZOO

## New Methods— New Machines

Certainly, **yes** is the answer. We've been keeping in the forefront of finishing equipment development for years and we will have new postwar tools for you, but every one of them will have been tested in the crucible of practical use.

Hammond builds a complete line of Carbide, Abrasive Belt and Wheel Grinders • Polishing and Buffing Lathes • Automatic Polishing, Buffing and Cylindrical Finishing Equipment.

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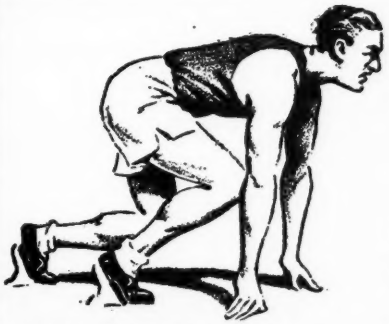

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The goal of every plating plant is to have clean, grit-free polished solutions so that finishes will be smooth and brilliant. The Sparkler method of filtration removes *all* foreign impurities that tend to impair the quality of finishes—increases the volume of satisfactory end-products.

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SPARKLER HORIZONTAL PLATE FILTERS

*A Sparkler engineer will be glad to demonstrate how your finishes may be improved by using the Sparkler system. Write for this free service, or any special information.*

bridge and is amply ventilated to prevent fogging of the lenses. Unusually light in weight (1¾ oz.), the goggle can be equipped with snap-in filters for torch welding or cutting, as well as for protection against other glares.

## DeVilbiss Type GDZ Degreasing Spray Gun

Designated as the Type GDZ, a pressure feed spray gun especially designed for industrial degreasing and cleaning operations on castings, forgings, sheet metal, and so on, is announced by The DeVilbiss Co., Toledo 1, Ohio. Operated from a pressure feed tank, the gun is constructed to handle all types of commercial solvents and cleaners, producing a heavy, driving, but well atomized, spray that speedily removes dirt and grease.

Unusually light in weight and shaped to fit the hand comfortably, the DeVilbiss Type GDZ Degreasing Spray Gun includes a two-finger, easy-to-pull trigger designed to reduce hand fatigue. When the trigger is pulled only part way back, air alone is emitted from the nozzle, thus permitting the gun to be used for dusting and drying operations.

DeVilbiss Type GDZ Degreasing Spray Gun

## Weldco Steam Jet for Pickling Tanks

Designated as the Weldco, a steam jet for pickling and water rinse tanks is now being offered by The Youngstown Welding & Engineering Co., Youngstown 9, Ohio. A combination mixer and agitator, the jet is made of wrought Monel and

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Your iron and steel products deserve the lasting protection against rust and corrosion that is guaranteed by the process of PENNizing . . . the Quality process of Hot Dip Galvanizing. Experience has proved that Hot Dip Galvanizing will assure greater protection and better service . . . you can be SURE of this when you use the PENNizing process . . . perfected by the Penn Galvanizing Company since 1910

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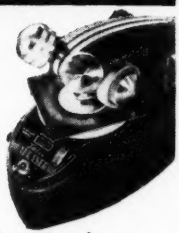

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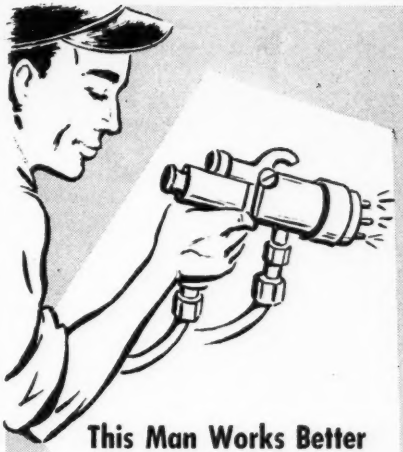

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Sickening paint smells are a common cause of slow downs in many plants. But they needn't be. Banish paint smells in your plant with Ridsmel. This specially developed liquid paint deodorant kills paint odors in swift seconds. No suffocating paint smell during painting. No lingering after odors. Guaranteed effective when used as directed in any paint, varnish, enamel.

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**Holley Chemical Co.**

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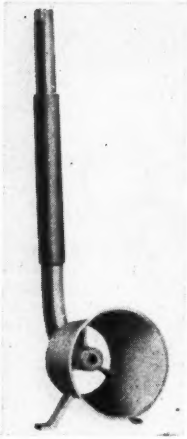


Weldco Steam Jet

welded with Monel electrodes, thus making the entire jet virtually one solid piece which is said to be resistant to the corrosive action of pickling solutions.

The Weldco Steam Jet can be readily attached to present steam lines without any auxiliary equipment or unusual fittings. The steam, on emerging at high velocity from the special nozzle of the jet, expands into a scientifically designed bell-shaped housing, thus creating a strong suction at the rear of the bell. Being open, the rear end of the jet permits this suction to draw the solution from the corner of the tank in back of the jet, and the suction creates an incoming current which circulates from the side of the jet.

The abundance of power generated by the steam swishing forth into the solution in a broadening diameter circulates the pickling liquid forward and around the pickling tank in a continuous cycle. Under this flow of steam power the pickling acid is heated and agitated. Thus, the continuous and complete circulation, combined with the agitation, is said to maintain pickling solution uniformity throughout the length and width of the tank.

---

**Arco Optonic Color System** is the subject of a 12-page booklet prepared by The Arco Co., 7301 Bessemer Ave., Cleveland 4, Ohio. The purpose of this booklet is to outline the factors to be taken into consideration in the proper selection of colors according to the optonic system. As mentioned in the booklet, the correct use of color in industry promotes safety and sanitation, increases employee efficiency, and stimulates morale.

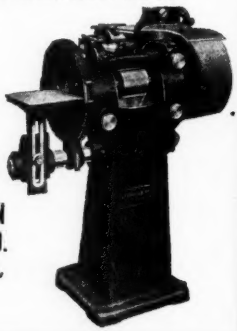
Included in a pocket on the back cover of the booklet is a folder containing samples of Arco Optonic colors in Arcotone and Arcovar for modern decorative finishing. Copy of bulletin free to executives upon request.


**FOUR IN ONE**

**Grinding and Polishing Machine**

This type R machine is a combination of several types of grinding and polishing machines. It can be used for disc grinding—polishing—burring and surfacing.

*Write for illustrated folder*



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GREENFIELD, MASS.

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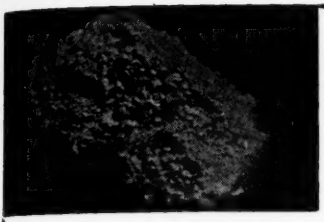

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**Our many colors and varieties of finely cut fibres—"Flock"—can be applied to practically any material: paper, glass, steel, wood, cloth, plastic, etc.**

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## DECORATIVE

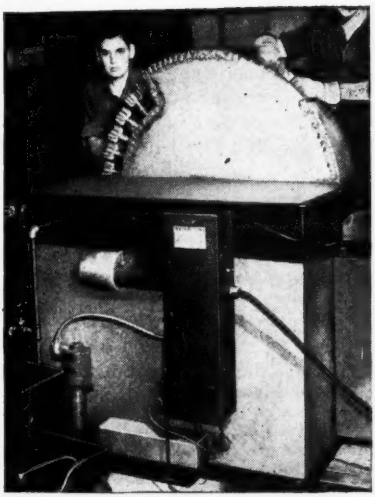
Applied in various lengths and colors to wood, paper, cloth, metal, etc., the following effects are produced—

**SUEDE LEATHER • FURNITURE UPHOLSTERY FABRICS • AIRPLANE AND AUTO UPHOLSTERY FABRICS • VELVET • VELOUR • MOHAIR.**

*REQUEST SAMPLES AND PRICES*

**RAYON PROCESSING CO. OF R. I., INC.** • **65 TREMONT STREET CENTRAL FALLS, R. I.**

# Sets New Records in Degreasing Die-Castings



One of America's leading war plants making die-cast ordnance components reports a remarkable increase in degreasing output and efficiency after installing Phillips Vapor Degreasing equipment using PHILLSOLV. Production showed one manually operated unit: "Cleaned 2675 pieces per hour; 24,000 parts cleaned between solvent changes"; another "cleaned 2400 pieces per hour, 22,000 cleaned between solvent changes," and this with one of the smallest Phillips Units.

PHILLSOLV offers many advantages: lowest toxicity, non-flammable, handles wider range of greases, speeds production, less solvent loss, will not etch or pit.

### EVERY TYPE OF METAL CLEANING

The Phillips line includes every type of metal cleaning machinery—Vapor-degreasers, alkali and emulsion washers. Phillips Engineered Service offers a specialized machine for any metal cleaning problem—with lowered costs and increased output. List of installations available on request. Write for latest Phillips Catalog of metal cleaning machinery.

### SEND FOR FREE DEGREASING MANUAL

Contains specific information on degreasing problems, solvents, solvent toxicity and control, solvent recovery, and many practical applications. A request on your letterhead will bring you a copy at once.

**PHILLIPS MFG. CO.** **3447 W. TOUHY AVENUE CHICAGO 45, ILLINOIS**

**Weldco Corrosion-Resistant Chain** is the subject of a four-page illustrated folder released by The Youngstown Welding & Engineering Co., Youngstown 9, Ohio. The folder discusses the various advantages of Weldco Chain, which is available in standard sizes from ¼ to 1¼ inches made from Monel, stainless steel, nickel, or Inconel, and contains tables giving complete specification data on the chain. Copy free upon request.

## *Opportunity Section*


**WANTED**

**DUST COLLECTING ENGINEER**

Dust Collecting Salesman for wood, shoemaking and foundry plants, etc. Must have experience in designing and layout, also knowledge of fan engineering. Write Box No. 41, Products Finishing, 431 Main St., Cincinnati 2, Ohio.

**PLATING & POLISHING EQUIPMENT WANTED**

***(New or Used)***

Electroplating Generators
Electroplating Rectifiers
Plating Tank Rheostats
Plating Barrels
Ball Burnishing Barrels
Tumbling Barrels
Burnishing Balls
DC Ammeters and Voltmeters
Polishing and Buffing Lathes

***"Idle Equipment Is Wasted Equipment"***

**Write us full particulars and our representative will call.**

**BAKER EQUIPMENT CORP.**
**143 Sidney St., Cambridge 39, Mass.**


**King's Plating Barrels.** A 12-page catalog illustrating and describing white oak machine woven plating barrels has been issued by John King, 38 Springfield St., Dayton 3, Ohio. A price list of standard size plating barrels for nickel and other solutions is included with the catalog, copy of which is available free upon request.

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**Industrial Cleaning and Allied Process Equipment.** The Optimus Equipment Co., 133 Church St., Matawan, N. J., has published a four-page bulletin illustrating and describing a complete manufacturing and engineering service covering units from the smallest portable type to complete automatic equipment, including an entire series of metal-cleaning and allied process operations. Copy of Bulletin No. 4E1 free upon request.

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**"Chemicals for Industry."** A 16-page pocket-size booklet listing Hercules chemicals, including types available, their end uses, and pertinent packing and shipping information, is now available from the Cellulose Products Department, Hercules Powder Co., Inc., Wilmington 99, Del. The chemicals listed include nitrocellulose, cellulose acetate, and ethyl cellulose. Copy of "Chemicals for Industry" free upon request.

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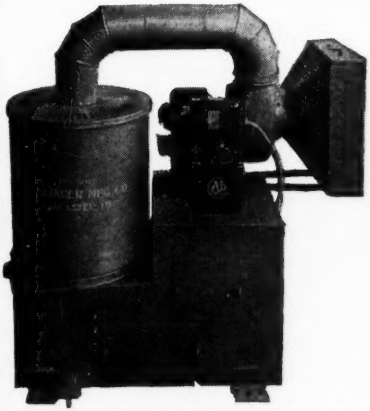
**"What We Make,"** a 199-page pocket-size catalog and engineering data book containing a description of a complete line of air handling equipment and its application in a variety of industrial systems such as heating, ventilating, air conditioning, drying, dust control, fume exhaust, vacuum cleaning, vapor absorption and other systems, has been prepared by the B. F. Sturtevant Co., Hyde Park, Boston 36, Mass. Fully illustrated with photographs of units, system applications, and sectional drawings, the catalog also includes more than 80 pages of engineering and design data as well as many often-used formulas and tables and a new psychrometric chart for determining values of air properties in heating, cooling, humidifying, and dehumidifying problems.

Copy of the catalog is available to interested individuals addressing requests on their company letterheads.

KREIDER *Centrifugal* DRYER

*"On the Double"*
**DRYING!**



Wartime production demands speed... and the Kreider Centrifugal Dryer gives you speedier drying on all types of plated work and small lacquered parts. It dries the average basket of small parts in 35 seconds!

The Kreider Centrifugal Dryer is ruggedly constructed; electric welded; equipped with V-belt drive; ¾ hp motor; reversing drum switch and fast-acting foot brake. Requires only one operator; takes minimum floor space. Engineered for top speed and efficiency.

*Write or wire for complete information and prices. Available with or without auxiliary heating unit.*

**DELLINGER MANUFACTURING COMPANY**
**729 N. Prince St., Lancaster, Pa.**

**SILCO**

**NEW GLASS-BASE FINISH**

**Both Beautiful And Tough!**

If your product must take punishment and still look bright and attractive, SILCOize it. SILCO is a new finish for steel and brass that stubbornly resists corrosion, impact and abrasion—stands heat up to 1000° F.—and is unaffected by mild alkalis, most acids.

In face of all this, it has a beautiful eggshell finish available in black, white and any color. Anybody can work SILCO. Just spray it on and dry it at 200° F. Then cure in a half hour in any industrial oven at 350° F. A gallon covers 700 sq. ft. Priority free. Send parts for sample processing today.

**BLACK-MAGIC**

A fast black oxide finish for zinc, copper, brass and cadmium. A rich black that won't rub off. Also a one-bath process for all steels except stainless that works at 300° F. No priority. Ordnance approval. Samples on request.

***Midwest Field Office,***
***2651 W. Greenleaf Ave.,***
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**BLACK-MAGIC BLACKING SALTS for STEEL, IRON COPPER, ZINC CADMIUM**
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**WITCH-DIP WITCH-OIL FINAL FINISHES**
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**SILCO PROTECTIVE COATING**
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**Cleaners Wetting Agents Acid Inhibitors Heat Treating Salts**
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**MITCHELL-BRADFORD**
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**MODERN METAL FINISHES**
**2446D Main St., Stratford P. O., BRIDGEPORT, CONN.**

*The Finishing Touch* — **By J. A. Patterson**

***"But I never dreamt you was accidently caught and went through th' cleaner, Gus!"***